9 October 1972

Mr. Manus J. Fish, Jr.
Acting Director, National Capital Parks
National Park Service
1100 Ohio Drive, S. W.
Washington, D. C. 20242

Dear Mr. Fish:

The Environmental Protection Institute is pleased to submit the following Letter Proposal Number 101072 in response to your letter D24-NCP(CA) dated September 19, 1972

We propose to conduct a complete remote sensing survey of that section of Allegany County, Maryland between North Branch and Cumberland extending from the low-water line of the Potomac River to the B&O Railroad right-of-way on the north.

We propose to obtain existing Goverment aerial photography for initial studies. We hope to obtain this photography on loan from the U. S. Department of Agriculture, U. S. Geological Survey, U. S. Coast and Geodetic Survey and U. S. Army Map Service through the good offices of the National Park Service. This photography will be examined in detail, and used to plan subsequent operations. These will consist of flight planning operations and limited field work. Specific photos which are found to be most valuable will be purchased for preparation of our Final Report.

Special natural color and color infrared aerial photography will be obtained of areas which appear to show evidence of early C&O Canal operations. This special aerial photography will consist of vertical or convergent-mode vertical 35mm photography. The mode used will bepend on the density of tree and brush cover (if any) in the critical areas. Convergent-mode oblique photos for stereo study will be obtained from several directions also. The specific mode and amount of photography to be obtained will depend on the findings made during the initial studies.

Initial studies will include some field work. This will be undertaken to confirm or deny suspected features which may be discovered.

SLAR (Side-Looking-RADAR) and IR Imagery may reveal features which are masked from surface observation and detection. We will check with the U. S. Army TOPOCOM group at Fort Belvoir to see if any such imagery is available. This will be done during our initial studies. Any findings which are made will be used to augment those

which are expected in photointerpretation studies.

Special aerial photography will be obtained in co-operation with Air Photographics, Inc., Silver Spring, Maryland.

Natural color and color-infrared photography will be obtained. This photography will be studied in detail, correlating it with other available forms of imagery. Further field work will be undertaken, as warranted.

Our final report will consist of text description, illustrated by maps and photographs, as appropriate.

We have been advised that orthophotos have been prepared of much of the area. If such coverage exists of the critical area, it will be used as a 'plotting base' on which to match findings made using other forms of imagery.

We propose to devote a total of thirty (30) man-days consulting services to this project; twenty (20) at $100 per day by Carl H. Strandberg, and ten (10) days at $100 per day by Dr. Rabchevsky.

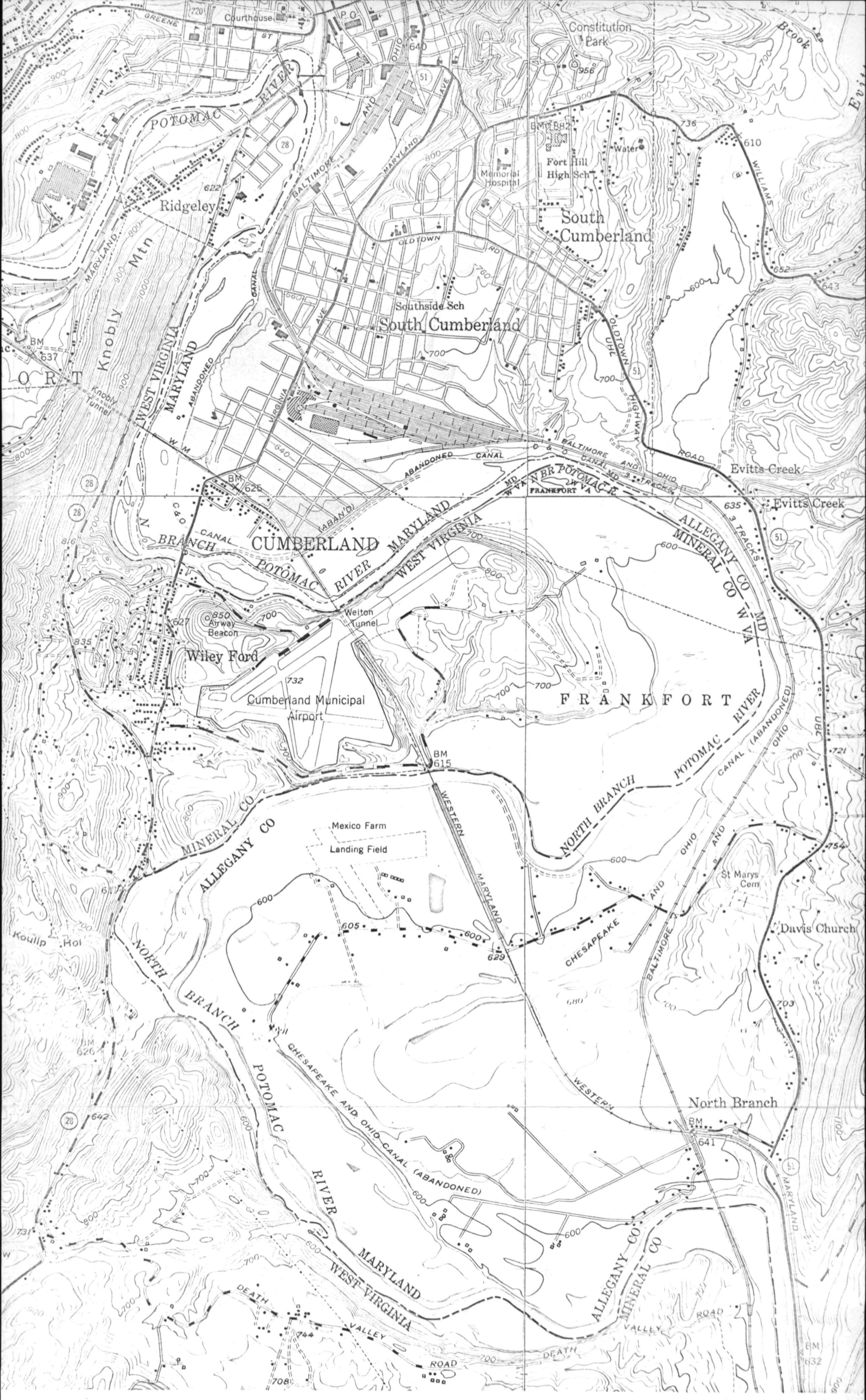
Expenses which are forseen total $1,525.00. This figure includes two round-trips (by air) from San Francisco to Washington, D. C., rental of a car for 10 days, per diem for 10 days, cost of aircraft and pilot for the special photo mission, and the cost of film and processing.

Total costs for the project proposed are $4,525.00.

Baring acts of God, severe weather problems including floods, and other problems beyond control of the Institute, we propose to complete our servey within 30 days of receipt of a contract.

Sincerely yours,

Carl H. Strandberg, President
Environmental Protection Institute
2114 Olive Avenue
Fremont, Ca. 94538



Courthouse
P O
Constitution Park
GREENE ST
POTOMAC RIVER
BALTIMORE AND OHIO
MARYLAND AVE
Ridgeley
Knobly Mtn
Knobly Tunnel
Fort Hill High Sch
Memorial Hospital
Water
South Cumberland
OLDTOWN RD
Southside Sch
South Cumberland
WILLIAMS
Brook
UHL HIGHWAY
OLDTOWN ROAD
WEST VIRGINIA
MARYLAND
ABANDONED CANAL
VIRGINIA AVE
W M
BALTIMORE AND OHIO CANAL
Evitts Creek
Evitts Creek
FRANKFORT
C&O CANAL
N BRANCH POTOMAC RIVER
CUMBERLAND
ALLEGANY CO MD
MINERAL CO W VA
Welton Tunnel
Airway Beacon
Wiley Ford
Cumberland Municipal Airport
FRANKFORT
POTOMAC RIVER
NORTH BRANCH
CANAL (ABANDONED)
OHIO AND
MINERAL CO
ALLEGANY CO
Mexico Farm
Landing Field
WESTERN MARYLAND
St Marys Cem
Davis Church
CHESAPEAKE AND OHIO
BALTIMORE
Koulip Hol
NORTH BRANCH POTOMAC RIVER
CHESAPEAKE AND OHIO CANAL (ABANDONED)
WESTERN
North Branch
MARYLAND
WEST VIRGINIA
ALLEGANY CO
MINERAL CO
DEATH VALLEY ROAD
DEATH VALLEY ROAD

Division of Archeology
11 Feb 74

Capt. Carl H. Strandberg
2114 Olive Avenue
Fremont, California 94538

Dear Capt. Strandberg:

The Department of Natural Resources is embarking on a program of research and reconstruction at Fort Frederick in Washington County, Maryland. Construction of the stone fort began in 1756, was converted for use as a prison during the Revolution, and was then abandoned. The interior and some exterior areas were subjected to extensive striping operations during the 1930's by the CCC under untrained and unskilled supervision, but the meager historical record for the fort from the 18th century suggests that there were ancillary areas of activity nearby, including a civilian settlement and a cemetery.

Garry Stone of the St. Mary's City Commission informs me that you are prepared to arrange for aerial photography and to make photointerpretations of historical/archeological sites. We would appreciate a cost estimate for a study of the immediate fort area (ca. 500 ft. radius), and another estimate for a larger area (ca. 3/4 mi. diameter), as shown on the enclosed copy of the Big Pool 7.5' quadrangle. At the present time, most of the area within the state park is in lawn and grassland, although there are areas of timber. Most of the area west of the park is under cultivation. If there is additional information that you require in order to make a cost estimate, please let me know. We understand that you may use more than one type of film, including color and color infrared.

I am already familiar with your work on the Potomac fishtraps, but I would appreciate a professional vita and any other information that you care to send.

Sincerely,

Tyler Bastian
State Archeologist

TB/nab
encs.

received 21 Feb 74
by certified air mail
ret. receipt req.

2114 Olive Avenue
Fremont, Ca. 94538
18 February 1974

Mr. Tyler Bastian
State Archaeologist
Maryland Geological Survey
Latrobe Hall
The Johns-Hopkins University
Baltimore, Maryland 21218

Dear Mr. Bastian:

Thank you very much for your letter dated 11 February, 1974.

Your project sounds fascinating, and I will be glad to undertake work on it immediately.

I propose to obtain the existing USDA and/or USGS aerial photography as an initial step, and study it while reviewing what literature you have about Fort Frederick.

I will have to subcontract for some color infrared vertical aerial photography of the area. The time of year is very important here. Best result can be obtained in archaeological analyses when the new grass is just coming up, before the trees get their full leaf foliage. My experience has convinced me that best results can be gotten in Maryalnd in April.

I will have to spend about a week back there. In this phase of operations, I will take more aerial photography, some of this being oblique multiband stereo coverage. This is a special type developed by me in my work for the National Park Service.

I will undertake the entire project for $2,500.00, plus the cost of the subcontract work. This should not cost much. There is (or was) an excellent firm in Silver Spring with whom I have worked in the past. I estimate that the subcontract work should cost no more than $200.00.

Photo Service

If I can get started by 1 March, I should be able to complete field work and submit my report to you, with maps and photographs, by 30 June.

I am looking forward to hearing from you.

Sincerely yours,

Carl H. Strandberg

Encl: Professional Resume

Division of Archeology
22 Feb 74

Robert Bushnell

Tyler Bastian

aerial photographic study of Fort Frederick

proposal by Strandberg for aerial photographic study of Fort Frederick

I realize that we do not have the funds to hire Strandberg at his price, but it may be possible to use his services in the future. In the meantime, I am checking further on his ability to do the kind of job we need done, and I am also attempting to locate someone else who will quote us a price. I have written to Glenn Little, but I have not heard from him and I understand that he is out of archeology. Please give me a call if you want to discuss Standberg's proposal.

TB/nab
encs.

Division of Archeology
22 Feb 74

Capt. Carl Strandberg (Ret.)
2114 Olive Avenue
Fremont, California 94538

Dear Capt. Strandberg:

Thank you for the proposal for photoarcheological study of Fort Frederick in Maryland. Can you provide us with the names of specific archeological projects or literature citations to archeological projects on which you have worked apart from the Potomac Fishtraps? I have a copy of Itek's August 1965 report on Archeological Photointerpretation of Missouri Valley sites, although the authorship does not seem to be indicated.

Sincerely,

Tyler Bastian
State Archeologist

TB/nab

blind cc: Robert Bushnell
encs.

Mr. Tyler Bastian
State Archaeologist
Maryland Geological Survey
Latrobe Hall
The Johns-Hopkins University
Baltimore, Maryland 21218

2114 Olive Avenue
Fremont, Ca. 94538
3 March 1974

Dear Mr. Bastian:

Thank you for your letter dated 22 February 1974.

A copy of my publication list is enclosed. Items number 19, 31, 52,53,59,65,68, 71 and 73 are archaeological reports. All of them stem from projects which I have conducted or in which I have played an active role. Three of these deal with fishtraps in the Potomac (#31,#65, #68). The area covered by #31 is downstream from the area covered by numbers 65 and 68. These latter two cover the same area of the river, but are illustrated differently. The maps used in #68 are reduced-scale USGS 7½-minute Quads.

In the period following publication of #65, I worked with the Maryland Archaeological Society section in that area, to extend the field work which was initiated by the findings reported in #65. The Indian village which was found on George Mason Island was identified as Conoy, which was the Indian capitol visited by the Governor-General of Virginia in 1713.

but see his article in Amer. Antiq. v.34 #3 p. 317

In addition to these findings, I found three villages along Seneca Creek in Montgomery County. Germantown quad, no data

Do you have a copy of my third book, the Aerial Discovery Manual (item #54 on my publication list)? The three villages mentioned above are on the Windolph farm, in the area illustrated in Figure 13.3. There are several fishtraps and villages in the area covered by Figures 4.7, 4.8, 4.9, 4.10 and 4.11. & 14.5 George Mason Island is the upper island in the Potomac in Figures 4.10 and 4.11. Conoy is in the area just off the edge of the photographs.

on Heater's Island, not Geo. Mason
Torrubia & NPS put a 'Piscataway Et' on Kenmore Is.

Regarding the authorship of the Itek report (full title, "Archaeological Photointerpretation")(See item #52for further reference data) I conducted the field work and planned the photo mission, and did much of the photointerpretation - but did not write the report. This was a group effort.

I agree in general with the conclusions. My only disagreement is with the stated value of oblique photographs, mentioned in paragraph 8.10 (on page 51). I think that they can be very valuable when taken so that one can study them using convergent oblique stereo, as I do.

I hope that these references and data will be of interest and value to you. A copy of paper #71 is enclosed.

Sincerely yours,

Carl H. Strandberg
Captain USMC (Ret.)

Al Woolworth
Minn Hist Soc.
re Carl Strandberg and
Minn's Et I' Kuiller
project.

21 Mar 74

Strandberg

experienced
technically competent
forest
romanticist
a little hokey interpretations

intelligence unit
Air Natl Guard —

Division of Archeology
27 Mar 74

Capt. Carl H. Strandberg (Ret.)
2114 Olive Avenue
Fremont, California 94538

Dear Capt. Strandberg:

We are pleased that you are able to undertake the photoarcheological study of Fort Frederick. Copies of the 7.5' quadrangles showing the study area are enclosed. I have penciled in the green overprint from the originals.

We are also sending you copies of the principal historical statements and two of the primary sources concerning the Fort. Three photographs are also enclosed (our copy negatives, nos. 482 & 484A, add a postcard). I have two additional photos from the 1930's which I will send after I have prints made. Bushnell is sending you some recent aerial photos. Also, I have an 18" by 20" print of the Nov 1937 USDA photo (AHB 43 33; although the frame above to the north would include more of the area of concern). As you indicated that you would obtain the USDA/USGS photography, I will not send our 1937 photo unless you request it.

rec'd. 5 Apr 74

The contract for your signature will be sent from Annapolis to you this week. If there are questions about the contract or other matters which we can help you with, please do not hesitate, to contact Robert Bushnell in Capital Programs or myself.

Sincerely,

Tyler Bastian
State Archeologist

TB/nab
encs.

cc: Bushnell

Mr. Andrew Martin
Photo Science Inc.
Gaithersburg Air Park
Gaithersburg, Maryland 20760

2114 Olive Avenue
Fremont, California 94538

21 April 1974

Dear Mr. Martin:

This letter constitutes a PURCHASE ORDER for aerial photography of a portion of the Fort Frederick State Park, near Cumberland, in Washington County, Maryland.

This Purchase Order is issued as a Sub-contract to Maryland Department of Natural Resources Contract dated 3 April 1974, issued to me in response to my letter proposal to the Department of Natural Resources, State Archaeologist, number 021874, dated 18 February 1974.

PHOTOGRAPHIC SPECIFICATION

Original Film:

Vertical color infrared aerial photography, scale 1/3,000, format 9"X9", is required, of the area shown on ENCLOSURE #1 (Section of BIG POOL and adjoining USGS 7½-Min. Quadrangle), following the flight lines which have been drawn.

Flight lines have been drawn to optimize coverage for archaeological purpaoses, providing RF Scale 1/3,000 photographs, 60% overlap (40% Ground Gained Forward. Photographs in adjoining parallel flight lines to overlap (side lap) 30%.

Dimensions specified above should permit complete coverage expending thirty (30) exposures (six (6) photographs in each of five (5) parallel flight lines).

Eastman Kodak Type 2443 Aerial Color Infrared Film will be used.

FILTERS

A Wratten 16 or equivalent filter will be used. An appropriate set of correction filters, determined by the sensitometric characteristics of the specific Lot of film used will be employed to maximize hue and saturation response of the film, employing standard E-4 processing.

Data on the filter packet used will be provided when the film is delivered.

BLACK AND WHITE CONTACT PRINTS PREPARED FROM COLOR INFRARED ORIGINAL PHOTOGRAPHY

The original color infrared film will be contact printed on a black and white duplicating film Dupont 228 R (or equivalent).

The "Duplicate" negatives which are produced will be contact printed on a standard grade (Eastman F-2 or equivalent) photographic paper to produce two (2) sets of reflection prints.

DELIVERABLE ITEMS

1. Original Color Infrared aerial photography.

2. "Duplicate" Black and White negative prepared using the "color-blind" type of duplicating film specified, prepared from Item #1.

3. Two (2) sets of contact prints, prepared by contact printing Item #2.

COST AND PRICE

As agreed in our telephone conversation on 17 April 1974, I agree to pay the sum of four hundred and eighty five dollars and no cents ($485.00) on receipt and acceptance of Deliverable Items 1, 2, and 3.

Payment of this sum at the time specified is contingent on receipt of Progress Payment #1 from the Maryland Department of Natural Resources.

Very Truly Yours,

Carl H. Strandberg
Captain USMC (Ret.)
Consultant

AGREEMENT

THIS CONTRACT, EXECUTED ON THE 3rd DAY OF April, 1974, BY AND BETWEEN THE STATE OF MARYLAND, ACTING THROUGH THE DEPARTMENT OF NATURAL RESOURCES, CAPITAL PROGRAMS ADMINISTRATION, HEREINAFTER REFERRED TO AS THE DEPARTMENT, CARL H. STRANDBERG HEREINAFTER REFERRED TO AS CONSULTANT.

WITNESSETH THAT:

NOW, THEREFORE, FOR AND IN CONSIDERATION OF THE MUTUAL AGREEMENTS AND COVENANTS AS HEREINAFTER SET FORTH, THE PARTIES HERETO AGREE AS FOLLOWS:

1. CONSULTANT AGREES TO PROVIDE THE FOLLOWING SERVICE:

CONDUCT AN AERIAL PHOTOARCHEOLOGICAL SURVEY AT FORT FREDERICK STATE PARK. THIS SURVEY WILL INCLUDE THE IMMEDIATE AREA OF THE FORT AND AN AREA APPROXIMATELY ONE (1) MILE RADIUS FROM THE FORT. THE CONSULTANT WILL SUB-CONTRACT FOR COLOR INFRARED VERTICAL AERIAL PHOTOGRAPHY AND WILL ALSO UTILIZE OBLIQUE MULTIBAND STEREO COVERAGE. ALL PHOTOGRAPHIC AND RELATED MATERIALS WILL BECOME THE PROPERTY OF THE DEPARTMENT.

2. COMPENSATION TO CONSULTANT WILL BE NOT TO EXCEED, AS DETAILED IN ATTACHED PROPOSAL IN THE AMOUNT OF $3,000.00/ FOR ALL LABOR AND MATERIALS DESCRIBED WITHIN PARAGRAPH 1 HEREIN RECEITED ABOVE. PAYMENT SHALL BE ONE-THIRD (1/3) OR $1,000.00 UPON COMPLETION OF AERIAL PHOTOGRAPHY MADE SUBSEQUENT TO APPROVAL BY THE STATE OF / AND BALANCE UPON ONE HUNDRED PERCENT (100%) COMPLETION OF WORK, WORK PRODUCT IN THE AMOUNT OF $3,000.00 NTE, PAYABLE AT THE END OF THIS CONTRACT. THE PERIOD OF THE CONTRACT SHALL COMMENCE ON APRIL 1, 1974 AND TERMINATE ON ~~JUNE 1~~ JULY 15 29, 1974. COMPENSATION SHALL IN NO EVENT EXCEED THE AMOUNT OF $3,000.00.

3. MARYLAND SHALL BECOME THE SOLE OWNER OF ALL MATERIALS PLACED ON ITS PROPERTY.

4. NON-DISCRIMINATION IN EMPLOYMENT: CIVIL RIGHTS ACT. IT IS UNDERSTOOD THAT THE PROVISIONS OF TITLE VI OF THE CIVIL RIGHTS ACT OF 1964 ARE HEREBY INCLUDED IN THIS AGREEMENT TO THE END THAT NO PERSON IN THE UNITED STATES SHALL, ON THE GROUND OF RACE, COLOR, OR NATIONAL ORIGIN, BE EXCLUDED FROM PARTICIPATION IN, BE DENIED THE BENEFITS OF, OR OTHERWISE SUBJECT TO DISCRIMINATION UNDER THIS AGREEMENT. IT IS FURTHER UNDERSTOOD THAT THE PROVISIONS OF ARTICLE

498, Sections 17 to 20 (Discrimination in Employment) of the Annotated Code of Maryland, 1957 Edition, and as may be amended from time to time, are incorporated by reference and are made a part of this Agreement.

5. State of Maryland Saved Harmless. Consultant _____ agrees to protect, indemnify, and save harmless the State of Maryland, its officers, agents, and employees from and against all claims, demands, and causes of action and liability of any kind arising out of or sustained by virtue of the negligent performance of this Agreement. This responsibility in no way may be deemed a waiver of any and all immunities the DEPARTMENT may have.

6. Subletting or Assigning of Contracts. Consultant _____ shall not sublet, sell, transfer, assign or otherwise dispose of the contract or contracts or any portion thereof, or of their right, title, or interest therein, without written consent of the DEPARTMENT.

7. Warranty. Consultant _____ warrants that at the time of delivery the end items herein will be free from defects in material and workmanship. Consultant _____ further warrants that it shall provide skilled personnel as may be required to carry on the work in an efficient and expeditious manner at all times.

8. Entire Agreement/Governing Law. This Agreement constitutes the entire understanding between the parties hereto and may be modified only in writing, signed by authorized representatives of both parties. This Agreement shall be interpreted under and governed by the Laws of the State of Maryland.

9. Effective Date of Contract. It is understood and agreed by the parties hereto that this Contract shall not become effective or enforceable until it is approved by the DEPARTMENT.

IN WITNESS WHEREOF, THE STATE OF MARYLAND, DEPARTMENT OF NATURAL RESOURCES, CAPITAL PROGRAMS ADMINISTRATION, AND _____ CARL H. STRANDBERG HAVE EXECUTED THIS AGREEMENT AS OF THE DATE FIRST ABOVE WRITTEN.

STATE OF MARYLAND

April 6, 1974
(DATE)

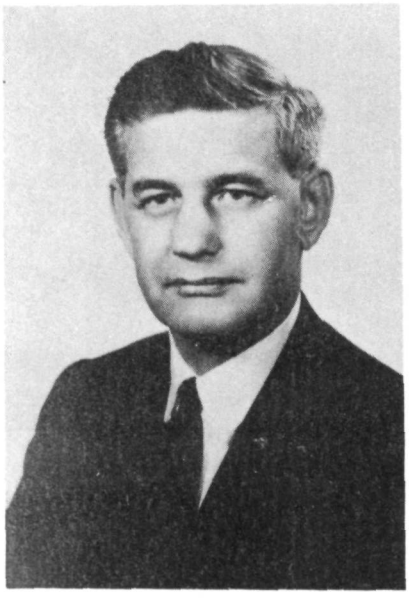
BY _____
THOMAS C. ANDREWS
ADMINISTRATIVE OFFICER

April 3rd, 1974
(DATE)

BY _____
CARL H. STRANDBERG

APPROVED AS TO FORM AND LEGAL SUFFICIENCY THIS 10th DAY OF April, 1974.

_____
SPECIAL ASSISTANT ATTORNEY GENERAL



CONCERNED ABOUT WATER POLLUTION?

The United States has more than 3,000,000 miles of flowing streams and thousands of lakes - and proper surveillance, vital if water pollution is to be conquered, demands that aerospace remote sensor technology be used.

PHOTOHYDROLOGICAL - PHOTOARCHAEOLOGICAL - PHOTOGEOLOGICAL CONSULTING SERVICES

Carl H. Strandberg
(Captain, USMC (Ret.))
2114 Olive Avenue
Fremont, California 94538
415-656-2871

Author of AERIAL DISCOVERY MANUAL
John Wiley and Sons, 1967

BACKGROUND

Active in intelligence, reconnaissance, and surveillance operations since 1943. Active in water pollution surveillance operations using aerial and aerospace technology since 1954. Initiator of, or participant in, more than 50 water pollution investigations and/or site inspections. Author of more than 50 papers, reports and articles, three books (Aerial Discovery Manual, first and second editions, 35 mm Aerial Photography for Measurement Analysis Presentation, first part of Manual of Color Aerial Photography, American Society of Photogrammetry, 1968, Chapter on Water Pollution, 4th Edition, Conservation of Natural Resources, John Wiley and Sons, 1970 (Senior Author, Dr. Guy-Harold Smith). Invited witness before congressional committee on water pollution problems. Established contacts with every state and Federal water pollution control group. Director, Alameda County Water District (public office).

Born: Minneapolis, Minnesota 26 November 1925. Military Service: U. S. Marine Corps from September 13, 1943. Photointerpretation Officer, G2, 1st Marine Division, Korea. Secretary, Marine Corps Development Center. Top Secret Control Officer.

Education: BA George Washington University. Graduate training in Geology and Personnel Administration.

Memberships: American Society of Photogrammetry, California Water Pollution Control Association, American Association for the Advancement of Science, International Remote Sensing Institute, Environmental Sciences Institute.

Fee and time schedule on request.

STRANDBERG, CARL HILDRETH DB: 26 Nov 1925

PUBLICATIONS

1. Tactical Deployment of the 8the U. S. Army Reserve, Okinawa, 1945 Published as a monograph at the U. S. Marine Corps Basic School, 4th Basic Class, Sept. 1947-May 1948

2. Aerial Photography from Light Observation Aircraft Aerial Photographic Interpretation Section, G2, 1st Marine Div. FMF (in Korea) Prepared by Captain Carl H. Strandberg USMC, Officer in Charge. Procedures incorported into StandingOperating Procedures. 1953

3. Aerial Surveys in Support of Fish Stocking Operations Marine Corps Schools, Quantico, Va. In support of base conservation program. 1954

4. Aerial Surveys in Support of Duck Blind Location Plan Marine Corps Schools, Quantico, Va. 1954

5. Tactical Atomic Weapon Site Selection Criteria Marine Corps Development Center, Marine Corps Schools, Quantico, Va. 1955

6. Management of Photointerpretation Projects Report to Marine Corps Development Center of operations of 1st Marine Division in collection and correlation of intelligence data from aerial photos. 1955

7. Tactical Photointerpretation Doctrine Plant for improvement of photointerpretation operations in the Marine Corps. MCDC. 1955

8. Alternative Sources of Water for Marine Corps Schools, Quantico, Virginia. Cooperative study with Army Corps of Engineers forced by drought in 1955. First paper in which author recommended use of aerial photographic interpretation for evaluation of surface water quality.

9. Practical Pistol Training for Marines July 1955, MCDC. Study initiated by applicant in cooperation with FBI for combat training of Marine Corps personnel. Received Letter of Commendation from Commandant of the Marine Corps.

10. Hawkins Prone (shooting position for sniping) MCDC 1955.

11. Ground Forces Aerial Photography Marine Corps Gazette, May, 1956. Based on systems developed in 1st Marine Div. FMF in Korea.

12. The Marines Have Landed Naval Aviation News, May, 1956. Written to show planning for operations circa 1975.

13. Berdan's Sharpshooters Marine Corps Gazette, Aug. 1956.

14. Problem: Crossing the River Marine Corps Gazette, July 1957. Article showing how photointerpretation techniques can be used to select stream crossing sites.

15. Military Maps SIMPLIFIED Marine Corps Gazette July 1959.

16. Pencil Practice (Simplified training method devised by author following lead of Warrant Officer fried) First published at MCDC in 1955. Republished in Marine Corps Gazette Feb. 1960

PUBLICATIONS

17. Hawkins Prone Marine Corps Gazette, April, 1960. Extension of work initiated at MCDC (see item #10).

18. A Better Way: FOR AIR-GROUND COORDINATION Marine Corps Gazette, July, 1960

X 19. Viking Age Landing Sites Along the Bass River Published privately by General Research and Development Company, Inc. to report on investigation conducted by applicant in October, 1960 following up on studies and findings made by Mr. Frederick Pohl on Cape Cod, Mass.

20. Integrated Aerial Sensor System for Monitoring the Dispersion and Diffusion of Heated Coolant Water Preliminary paper published under PHS Research Grant WP-181 by Principal Investigator (Carl H. Strandberg).

21. Aerial Survey of Acid Waste Dumping in the New York Bight Region II, DWS&PC PHS Survey conducted under a purchase order in 1961.

22. Pollution Source Survey: BALTIMORE HARBOR, MARYLAND Conducted by General Research and Development as part of a pre-proposal effort. 1961.

23. First Progress Report PHS Research Grant WP-181 - Aerial Methods for Montitoring the Dispersion and Diffusion of Heated Coolant Water. October, 1961

24. Problem: Selecting a Bivouac Area Marine Corps Gazette Jan 1961.

25. Royal Marines Marine Corps Gazette, October 1961. Received letter from Queen about article.

26. Netherlands Marines November 1961. Marine Corps Gazette.

27. Philippine Marines Marine Corps Gazette. January 1962.

28. Multiband Aerial Photography for Water Pollution Detection and Analysis Preliminary paper for DWS&PC USPHS prepared under WP-181 describing use of stereo camera with different filters over each lens.

29. The Raid Marine Corps Gazette February 1962

30. Analysis of Thermal Pollution from the Air Presented at the 17th Industrial Wastes Conference, 3 May, 1962, Purdue, University.

X 31. Ancient Indian Fish Traps in the Potomac River Photogrammetric Engineering July 1962

32. Second Progress Report DWS&PC Research Grant WP-181 August 1962

33. 1,2,3,4,and Final Progress Reports FWPCA Demonstration Grant WPD-20. Final Report submitted in December 1967.

34. Aerial Methods for Water Pollution Surveillance Presentation Requested by House Committee on Government Operations June 1963.

PUBLICATIONS

35. 35mm Aerial Photography for Measurement-Analysis-Presentation (First Edition) 1963. Prepared under USPHS Demonstration Grant WPD-20-1

36. 35mm Aerial Photography for Measurement-Analysis-Presentation (Second Edition)1964. Prepared under USPHS Demonstration Grant WPD-20-S1

37. Can We Dig In? Marine Corps Gazette, June, 1963

38. Water Resources Recreation Needs Water Pollution Control and Abatement (Part 1B-National Survey) Hearings before a Subcommittee of the Committee on Government Operations, 88th Congress, First Session, pages 1771-1775 (Companion presentation to #34, this list).

39. Potomac River Fish Kill Aerial Survey a Report to the USPHS prepared under USPHS Demonstration Grant WPD-20-1 July, 1963

40. Analysis of Thermal Pollution From the Air Photogrammetric Engineering, July, 1963

41. An Aerial Water Quality Reconnaissance System Photogrammetric Engineering, January, 1964.

42. Aerial Reconnaissance - The New Look Manuscript for the Marine Corps Gazette. November, 1964

43. Extremely Small Scale Aerial Photography Report covering use of 35mm vertical aerial phtography taken with a 21mm lens from 31,000 feet (scale about 1/446,000) conducted for Itek Corporation in preparation of a classified proposal. Spring, 1965.

44. Water Quality Analysis Presentation during the 1965 Annual Meetings of the American Society of Photogrammetry, Washington, D.C. March 1965

45. Water Quality Analysis Photogrammetric Engineering, March, 1966 (modified version of #44)

46. Color Aerial Photography (Unique Intelligence Collection Value) (Classified) 1966

47. Color Aerial Photography for Water Supply and Pollution Control Analyses Report for FWPCA prepared under Demonstration Grant WPD-20-S1 March 1967.

48. Acid Mine Drainage Reconnaissance Service Program Report to the FWPCA prepared under Contract 14-12-68. Report dated 30June 1967.

    In this report, mosaics were prepared of a 622 square mile area in Pennsylvania and West Virginia. The area had been studied in stereo, and 242 previously unreported mine shafts and tunnels (and other mine openings) from which acid drainage flowed located. These pollution sources were encoded in the USPHS Storet System computer memory file.

PUBLICATIONS

49. Remote Sensing of Water Pollution - University of Michigan Geography Summer School, 1967.

50. Casco Bay Aquatic Vegetation Survey - Report to Marine Colloids Corporation, July 1967.

51. Toxic Soil Photoanalysis Investigation - Report to the FWPCA prepared under Purchase Order 67-2-108-1 December 1967

X 52. Photoarchaeology Photogrammetric Engineering, October, 1967. Abbreviated version of Technical Report ITEK 65-8458 dated 27 August 1965 prepared for the National Park Service under contract No. NPS-WASO-II-65/1 (Neg).

X 53. Archaeological Analysis Using Color Aerial Photography ASP-ACSM 1967 Convention Paper Number 199

54. Aerial Discovery Manual John Wiley and Sons, Inc. 1967. 249 pages.

55. Aerial Techniques for Water Pollution Analyses Remote Sensing Short Course for College Teachers of the Natural Sciences University of Michigan, 1968

56. Remote Sensing of Water Quality 1968 Symposium on Remote Sensing Cartwright Aerial Surveys, Sacramento, California

57. Aerial Methods for Water Pollution Analyses - Geography Summer School, McGill University, Stanstead College, Stanstead, PQ 1968

58. Aerial Survey of Piney Point Oil Spill - Report of survey conducted for Citizens Council for a Clean Potomac - October, 1968

X 59. The Search for Fort L'Huillier - Report of photointerpretation search conducted for the Minnesota Historical Society - November, 1968 (Fort L'Huiller was the first French fort constructed in the Upper Mississippi River Basin. The fort was built in June, 1700).

60. Manual of Color Aerial Photography (Chapter one) - American Society of Photogrammetry - 1968.

61. Aerial Photography - Part 1 - Volume 8, Photographic Applications in Science, Technology and Medicine Fall - 1968.

62. Aerial Photography - Part 2 - Volume 9, Photographic Applications in Science, Technology and Medicine Winter - 1968.

63. Aerial Photography - Part 3 - Volume 10, Photographic Applications in Science, Technology and Medicine - Spring - 1969.

64. Water Pollution - Program conducted during the Geography Summer School, McGill University, Stanstead College, Stanstead, PQ - 1969.

PUBLICATIONS

X 65. Photoarchaeological Analysis of Potomac River Fishtraps American Antiquity - July,1969

66. Water Pollution - Chapter in Conservation of Natural Resources, 4th Edition, John Wiley and Sons, Inc. Dr. Guy Harold Smith, Ed. 1970.

67. Water Quality in Lake Memphremagog - Prepared for the McGill Univ. Summer School in Geography, July, 1968.

X 68. Analysis of Ancient Fishtraps - Photogrammetric Engineering, August, 1970.

69. Environmental Technology - Training Syllabus published by Ohlone College for Course No. EN T 1A-51 and 1A-01 - September, 1970

70. Water Pollution Milieu Information Services, Inc. 1972, 150 pages.

X 71. The "Pig War" Photogrammetric Engineering, November, 1972 This paper reports on work conducted for the National Park Service in the Development of San Juan Island National Historical Park, in Puget Sound.

72. Stereomultiband Analysis - A report for the National Aeronautics and Space Administration, Ames Research Center, December, 1969.

X 73. September 19, 1737 - A report covering a key period in Pennsylvania History for one of the descendants of the key man in the history. On the date used as the title for this paper, the "walk" on which the "Walking Treaty" was based was made. The study objectives were to locate the graveyard in which the sponsor's ancestor is buried - using photointerpretation techniques.

Mr. Tyler Bastian
State Archaeologist
Maryland Geological Survey
Latrobe Hall - The Johns-Hopkins University
Baltimore, Maryland 21218

23 April 1974

Dear Mr. Bastian:

The Fort Frederick project gets more fascinating as time goes on!!

The literature you forwarded arrived and is being studied in detail.

A Letter of Intent was sent to Photo Science requesting a price for the photography which is needed. They responded with a price for the photography. The price was higher than I had expected - $485.00 -- but within the sum afforded by the Contract.

A copy of my Purchase Order 042274 for the photography is enclosed.

In reading the literature you sent me it was noted that "Captain Alexander Beall" was one of the officers of the Maryland Militia who was active in building Fort Frederick.

I presume that this was an ancestor of Senator J. Glenn Beall,Jr. and sent him a letter advising him of the work I am doing, and asking if he had any comments or historical records that might be relevant.

Senator Mathias was contacted also. He has a great interest in the history of that region.

Senator Mathias advised that he had introduced legislation to extend the C&O Canal National Historical Park from North Branch to Cumberland.

I have been in contact with the Director, National Capital Parks since 1972 to conduct a photoarchaeological survey of the area concerned, and suggest that it might be possible to conduct this survey as an addition to the current contract. The Federal funding has been held up pending passage of Senator Mathias' bill. This is currently in Interior, and I suggested to Senator Mathias that time and money could be saved if the two projects could be undertaken while I was back on the East Coast, rather than having to add travel time and expense to the second job.

I think that it might be possible to arrange for Federal reimbursement.

A copy of my proposal (issued by the Environmental Protection Institute) number 010172 (with a copy of a map of the region) is enclosed.

The cost of the aerial photography has gone up, as have costs related to field checking (use of a magnetometer, etc.). The saving in travel costs offsets this, however, so that I can conduct the program planned back in 1972 for the same price - provided that the task is undertaken at the time I am back in the area.

The only modification from the procedures outlined in the enclosed Proposal Number 101072 is that I would sub-contract with Photo Science for color infrared aerial photography of the area. Mr Martin advised that this would cost $1100.00. This sum would be included in the $1,525.00 expense budget estimated in the original proposal.

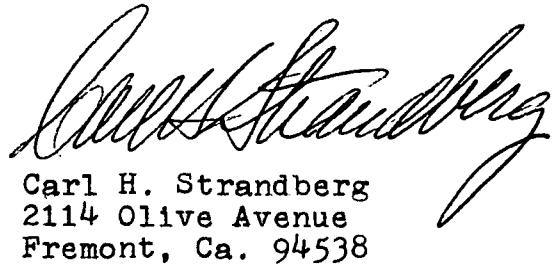
I would like to conduct a comprehensive survey of the fishtraps someday, too. At least six of the structures in the Potomac are navigation weirs which were emplaced by George Washington, I've been told. One of these six is just downstream from the Rt. 15 bridge near Frederick.

My initial photo search at NASA was most enlightening. I found that four complete sets of coverage exist of the entire State of Maryland.

I was advised that this photography is at NAS Moffett Field, out here in California. I will check it, and if it appears to be valuable for this project, will see if copies can be obtained. It is all very small scale (RF 1/130,000), obtained from a U-2 at 65,000.

I am looking forward to hearing from you.

Sincerely yours,



Carl H. Strandberg
2114 Olive Avenue
Fremont, Ca. 94538

Division of Archeology
8 May 74

Capt. Carl H. Strandberg
2114 Olive Avenue
Fremont, California 94538

Dear Capt. Strandberg:

We are pleased to learn of your progress on the Fort Frederick project.

Has the photography been flown by Photo Science? It is not clear from your letter or your purchase order sent to Photo Science when the work was to be done. I am concerned that it be done at the optimum time as determined by you.

It certainly would make sense to combine the C & O Canal project with the Fort Frederick study, but I can not suggest how they could be coordinated. Unfortunately, I have no liaison with National Capital Parks. Since funds are apparently unavailable for the C & O Canal study, it may be months or years before the photography can be authorized. You mention the possibility of Federal reimbursement by which I assume that you are suggesting that the State of Maryland undertake the C & O Canal study. I don't know if this could be arranged, but by copy of this letter I am asking James Mallow, State Naturalist with the Maryland Park Service, to consider the matter.

In any event, we do not want to delay the Fort Frederick project while waiting for the C & O Canal project to materialize.

I am pleased to learn of your continuing interest in the Potomac fishtraps. Have you made any comparisons with fishtraps in other areas, such as those reported from Iowa? What is your source of information concerning George Washington's involvement? I am also puzzled by Hobbs personal communication to you concerning Washington's knowledge of fishpots in the Potomac prior to 1785, cited in your 1969 American Antiquity article. What is Hobbs' source on this? The only fishtrap I have examined at close range is one on the south side of Heaters (Conoy) Island which is possibly the one near the Rte. 15 bridge which you mention in your letter. I was impressed by the huge size of many of the boulders comprising the structure. Is it possible that some of the "fishtraps" could be of natural origin?

I am not aware of any aerial photography for the Fort Frederick are of which you are not already aware. Our Westernport office has NASA Skylab 1:30,000 coverage of far western Maryland which includes the upper end of the C & O Canal, but the flight did not include Fort Frederick.

Please let me know if I can be of some assistance from this end. During June I will be running the University of Maryland field school in archeology near Annapolis, but it should be possible for me to meet with you when you are in Maryland.

Sincerely,

Tyler Bastian
State Archeologist

TB/nab
cc: R. Bushnell
J. Mallow

Mr. Tyler Bastian
State Archaeologist
Maryland Geological Survey
Latrobe Hall - The Johns-Hopkins University
Baltimore, Maryland 21218

9 May 1974

Dear Sir:

An initial examination of the photographs which you sent me, and a review of the literature indicates that use of a metal detector might be helpful when I conduct the field work.

Do you have a metal detector which I could use?

If you do not have one, and are interested, I could get one out here and bring it back with me. If you would like literature on them, I will be glad to send it.

Mr. Martin of Photo Science hasn't contacted me advising whether the Color Infrared photography ordered in my Purchase Order dated 21 April has been obtained yet.

As soon as the photography is received and accepted, I will advise you.

The agreed-on partial payment has not been received yet, and I hope that it has not been lost enroute.

I am looking forward to hearing from you.

Sincerely yours,

Carl H. Strandberg
2114 Olive Avenue
Fremont, Ca. 94538

Bob Bushnell
14-15 May 74

Who issued contract?
Copy to me?

1/3 or $1,000 upon complet of aerial photog.

and balance upon 100% of work

Transmittal sheet or packing

copy of his bill from Photo Science

send bill of $1000 to Bob, saying that aerial work has been rec. per specifications

ca. 2 weeks ago, images good, optimum time

spec. problem with paper
call Strasberg or phone

S. A. has one sub-professional assistant ~~to~~ and ~~very limited~~ ~~funds for summer~~ about $3,000 for summer and special assistance. During FY 1974 ~~the~~ he has earned to date (13 May 74) _____ hour of compensatory time and taken none of these. In addition, he works and receives time-calls from his home and does not report as compensatory time all hours spent working with ~~the~~ ~~~~ organizations. The ~~work~~ load for a professional assistant is compounded by the demand for review and comment ~~on~~ on EIS, ~~not~~ many of which require field checking which is not being accomplished under the present work load. Moreover, the POA is ~~to~~ specifically charged with making available instruction and exhibits to interested schools, a task which has not begun ~~the~~ since the PA was ~~to~~ ~~for~~ first funded in 1969. ~~The~~ ~~An~~ upper proffer worked is required to share the workload of the SA and to ~~be~~ enable to PA to respond to the ~~the~~ ~~program~~ ~~fulfill the~~ ~~speaking~~ and ~~demo~~ increasing demands which are being made upon ~~it~~ it.

Division of Archeology
16 May 74

Robert Bushnell

Tyler Bastian

Contract and map.

Since I seem to be Strandberg's contact man, I'd better have a copy of his contract. Can you send me one?

I recently noted the map with 5' contours in the pocket in back of the November 1970 master development plan for Fort Frederick State Park. Can you obtain 3 copies of the contour base of that map (i.e., without the planned improvements)? Please send one to Strandberg and two to me. The original is probably in several sections; we need only those which cover a mile radius of the fort.

Division of Archeology
16 May 74

Capt. Carl H. Strandberg
2114 Olive Avenue
Fremont, California 94538

Dear Capt. Strandberg:

We have contacted Andrew Martin of Photo Science, Inc., and learned that the Fort Frederick pictures were flown about two weeks ago under optimum conditions and that the results are satisfactory. Dr. Rabchevsky is involved with the work. A delay in forwarding the materials to you has been caused by some problem in meeting your specifications for paper. Mr. Martin was to have called you yesterday.

I have not seen a copy of your contract, but Bushnell tells me that you are to bill for one-third of the total when you receive the photos and have found them satisfactory. If you will forward to Bushnell your bill in triplicate along with copies of Photo Sciences' packing or transmittal sheet, he will see that payment is processed. The remainder of the agreed upon amount is to be billed when the project is completed.

We do not have a metal detector and will not have any funds with which we could consider buying one until after 1 July. Perhaps it would be possible for me to borrow one if you would give me some idea of the kind you have in mind.

Sincerely,

Tyler Bastian
State Archeologist

TB/nab
cc: Robert Bushnell
Capital Programs
Department of Natural Resources
Tawes State Office Building
580 Taylor Avenue
Annapolis, Maryland 21401

CARL H. STRANDBERG
2114 Olive Avenue
Fremont, Calif. 94538

The Pig War

An archaeological study applied color and color-IR photos on San Juan Island in Puget Sound.

ABSTRACT: *A photointerpretation study sought land scars that might remain after historical activities circa 1859 on San Juan Island in Puget Sound in Washington State. The value of low-level, convergent oblique, stereo, natural-color photos taken with a narrow-angle lens was reconfirmed. Also the value of a correlation of features imaged on black-and-white vertical photos with their color stereo obliques was reconfirmed. The value of stereomultiband photos obtained using natural-color film where only a slight difference exists in the transmission of the two filters appears to have significant potential. The value of oblique hyperstereoscopy was also reconfirmed.*

INTRODUCTION

ALL HELL broke loose on the morning of June 15, 1859; and when it did, it set the stage *very indirectly* for one of the most fascinating photoarchaeological projects I've been involved in. The project is one which was launched almost 112 years after the fatal shot was fired, but is a step forward in establishing the San Juan Island National Historical Park, which I hope all readers will be fortunate enough to visit some day.

Events on that spring morn in 1859 may have been a prelude to the Civil War. If they were, they were soon submerged in the thunder of cannons which roared from Sumpter to Gettysburg and beyond. Much of the tragic story of the Pig War remains a mystery to citizens of both the United States and her adversary, England.

Remote-sensing techniques employed in this project were not of the hypersophisticated *black box* variety. Time-tested and proven methods were used and they proved themselves, once again, to be very effective and valuable.

More will be said later about the methods which were employed. First let's take a look at the history involved. It casts new insight into the great history of our Nation, and may provide guidance in the solution the present, and God forbid, future wars.

Two cool-headed diplomats in uniform, Major General Winfield Scott, Commanding General, U. S. Army (a position similar to the current Chief of Staff, U. S. Army) and Rear Admiral R. Lambert Baynes, Royal Navy, thwarted the efforts of politically selfish citizens of both the United States and Canada. In so doing, they prevented our respective nations from blundering into a world war. Had it not been for these cool heads *and poor communications*, a major conflict could have erupted. Had either of these two commanders slipped on the diplomatic tightrope in which they found themselves, policians on both sides of our now peaceful northern frontier may have succeeded in starting a world war. All this is now history; the science to which wise men turn to when they seek a path toward wisdom in the resolution of current challanges.

THE PIG WAR

1859 dawned at the end of a sleepy decade. Before the year ended, a *war* has flashed and flared, one which could have seared history with the death of either the United States or England, or both. The *war* is called the *Pig War* because the only casualty was a pig. However, the history of the one armed confrontation is laced with international power politics. At stake was the precise location of a section of the international boundary between Canada and the United States. This location decided ownership of the 472 islands in Puget Sound and

the vast wealth of a large part of the Pacific Northwest.

Related to these events ran the challange which clouded our history from Fort Sumter, through Gettysburg and beyond to Appomatox Courthouse. The story of the Pig War is filled with some of the dash and daring of great men in history. Best known of these men was Captain George E. Pickett, U. S. Army, who, as Leutenant General Pickett, CSA, directed the charge at Gettysburg which bears his name less than four years later—a charge which I consider a futile tactical movement in which thousands of young Americans were sacrificed needlessly. Almost as well known as Pickett was Brigadier General William S. Harney U. S. Army, after whom Harney Peak in South Dakota is named. Harney was known in Texas, too. Years earlier, he unilaterally declared war on Mexico. This rash action, which included invading Mexico with a force of Texas Volunteers, almost ignited the Mexican War before its' place in history.

The Pig War, in the eyes of some historians reeks a stench of treason; or was it a *patriotic conspiracy*? Now, 112 years after the tragicomic events which led to the *Pig War*, a U. S. National Historical Park is being established on the *battlefield*, creating a site which all tourists to the Pacific Northwest should see. Readers are urged to order a copy of the fascinating book, *The Pig War*, from the Washington State Historical Society, Tacoma, Washington, and explore this fascinating period further, too.

Aerial Photographic Interpretation, *Remote Sensing*, was used to locate the key features marking critical events in the Pig War, many of which will be featured in the Park when it is completed.

Background

To give readers a better idea of the events which were confirmed using pictures taken from the air more than a century later, though, let us return to history for a moment.

Desperate events marked the end of the 18th century. About the time that George Washington assumed office as our first President, Spanish and British explorers sailed north into Puget Sound. In the year 1792, Captain George Vancouver, Royal Navy, met with the famed Spanish explorer Juan Bodega y Quadra on the island we now call Vancouver. The meeting was very formal and official. The meeting extended from the arrest of British fur poachers by Spanish officials, an event known as the *Nootka Sound Crisis*. When it was over, British power was established firmly in the area. Pressures from the fledgling United States began to grow after the Louisiana Purchase and these pressures mounted following the voyage of Lewis and Clark. The treaty of 1818 established the boundary between Canada and the United States as the 49th parallel from Lake of the Woods west to the Continental Divide.

American settlers moved westward. The British, through their trading monopoly, the Hudson's Bay Company tried by persuasion and direct pressure to confine American settlement to the Willemette Valley and along the tributaries of the Snake. By the 1840's it was clear that American expansionist pressure could not be confined, and settlement was established on some of the islands offshore in Puget Sound. By the terms of the Treaty of Oregon in 1846, lands north of the 49th parallel remained British; those to the south were ceded to the United States. They only major exception was Vancouver Island. Although partially south of the 49th parallel, the entire island was granted to England. This was done because the Hudson's Bay Company had moved their headquarters, Fort Vancouver, from the Columbia River north to Victoria, on the southern tip of Vancouver Island.

About this time (actually sometime between 1843 and 1845), the Hudson's Bay Company established the Puget Sound Agricultural Farm, a large farm specializing in raising sheep (for weaving the famed Hudson's Bay blankets) on San Juan Island (Figure 1). This island is the first island east of Vancouver Island. Several American settlers had become well-established in the islands, living as friends near their Canadian neighbors. In good fellowship, all believed that the exact location of the boundary would be resolved with no problem (Figure 2). By the terms of the Treaty of Oregon, the center of the *main channel* between Vancouver Island and the mainland was to be the boundary. The language used was not precise, however, and key officials on both sides of the issue could not agree which channel, de Haro or Rosario, was the main channel. The difference of just a few miles here dictated ownership of most of the islands in Puget Sound!

The boundary problem was settled, finally, by an International Agreement. The United States and England agreed to let an International Tribunal headed by the Emperor of Germany, Wilhelm I, resolve the thorny problem of deciding *which* was the *main channel*. An early form of very acceptable

FIG. 1. Many of the tragic events that led to the 1859 "Shot Heard Round the World" took place in these buildings. Not much remains of the Hudson's Bay Company Northern Agricultural Farm. Ranger Marvin Sharpe of the San Juan Island National Historical Park staff is shown here as he points out key features.

hydrological science was used. Noted pioneer geographer/hydrographers Drs. Grimm, Kiepert, and Goldschmidt spent extensive time studying surveys of water depth and the ebb and flow volume in the various channels. Their findings were forwarded to the Emperor, who decided in favor of the position held by the United States (that de Haro Channel was the main channel) (Figure 3). The Emperor's decision was published on October 21, 1872, and the Pig War was over.

In 1965 the National Park Service became interested in the story of the Pig War. In 1966, President Johnson signed the bill which elevated the area to National Park status and named the area *San Juan Island National Historical Park*. In so doing, to quote the final words in the book titled *The Pig War*, "Thus, this tiny dot of earth on the beautiful bay will always be a reminder that senseless wars over insignificant causes do not need to happen."

In the spring of 1859, though, things almost exploded. A farmer named Cutler cleared a field and planted potatoes just outside the Hudson's Bay Company farm, near Cattle Point. The Hudson's Bay Company raised pigs as well as sheep. The pigs were allowed

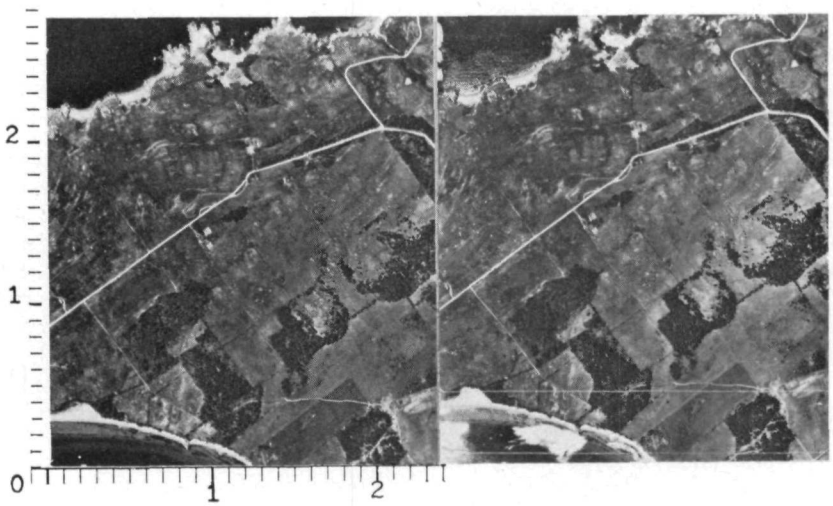


FIG. 2. The HBC post is located at coordinates 110/195 (explained below). The bastion in which Pickett's forces emplaced their artillery is located at 110/160. The American Camp was located just across the road from the bastion. Captain Pickett established his headquarters in the farmhouse at the end of the road across American Camp Road from the HBC post. Cutler's farm is still occupied. It is located on American Camp Road just off the right of the stereogram. San Juan City was located just off the left edge. The coordinates are like Eastings and Northings, refering to the scales, and stated in hundredths of inches (before reproduction). Thus, 1.0 is 1.10 units to the right of the origin.

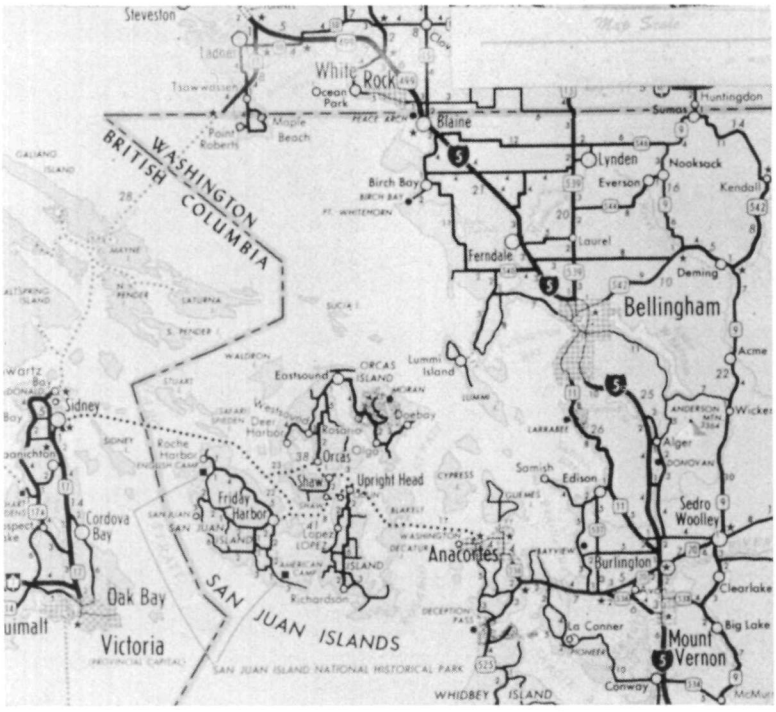


FIG. 3. Puget Sound is a fascinating region. The map indicates the vast region that was at stake. There are 472 islands in the Sound and the ownership of all of them hinged on which was the *main channel*, De Haro or Rosario.

to roam free. On the morning of June 15, 1859 the fuse was lit: Cutler came to the edge of his potato patch, rifle in hand, and saw a pig rooting among the rows. He shot the pig. This shot, akin to the one at Sarajevo in 1914 was *heard around the world*. Both national and international politics clouded the horizon in the smoke of Cutler's rifle.

Brigadier General William S. Harney was the Commander of American forces in the Northwest. Harney, who was from Tennessee, had serious political ambitions, reportably. He and his family had been active in the Democratic Party since the days of Andrew Jackson (who had been Harney's *sponsor* in his climb to power in the Army). Some historians claim that Harney hoped to inflame a National incident extending from Cutler's act by his actions in the weeks which followed. This school of thought contends that he hoped to gain national prominence and capture the Democratic Party nomination for President in 1860, a tactic also reputed to Custer in his massacre (which backfired) at Little Big Horn in 1876. Another school of thought contends that Harney hoped that, by creating a war with England he could offset the internal conflicts which led to the cessation of the south and the start of the Civil War (this is the *Patriotic Conspiracy* theory held by General George B. McClellan).

Harney organized an invading force which included substantial parts of both the 4th and 9th Infantry, supported by several Batteries of artillery. This force landed on San Juan Island. British forces responded, and a force of Royal Marines supported by several warships was mustered.

Captain George E. Pickett (USMA 1846), who was from Virginia, was Harney's *fair haired boy*. Pickett was placed in command of several officers of higher rank and placed in charge of operations on San Juan Island. Harney's excuse for moving military forces to San Juan Island was that he did so "to protect settlers from Indian raiders from British and Russian territories to the north", referring to Canada and Alaska.

Whatever the motivation, it culminated in the establishment of a substantial "American Camp on one end of the island on Griffin Bay (Figure 4), and a large English Camp at Garrison Bay on the other end of the island." A military road, which may have been a *plank road*, at least in part, connected the two camps. A substantial settlement, San Juan City, was founded just outside the American Camp.

FIG. 4. San Juan Island lay at the end of the American pioneer's march westward. English Camp was located at the north end of the island on Garrison Bay. American Camp was on the south end of the Island near Eagle Point, across from Griffin Bay. The military road extended for 12 miles past False Bay, Little Mountain, Mount Dallas, Cady Mountain, Mount Young, and on to English Camp; a dashed line shows its approximate location.

ENTER CARL STRANDBERG ASSOCIATES

We learned of plans to establish San Juan Island National Historical Park and undertook a project to locate all traces of the military camps and the road connecting them. Precise location of the sites where each building, gun emplacement and military storage facility existed was required. Much history is confirmed or denied by the location of artifacts. Restoration of the military encampment might be undertaken also. The key feature to be located was the road which had extended between the American and English Camps. Secondary features were the Hudson's Bay Company facilities, the City of San Juan, Cutler's farm, a *soldier's cemetary* and Cutler's potato patch.

OPERATION PLAN

Background study material included copies of maps which had been compiled in 1860 and 1874 (Figures 5 and 6). These maps showed shore features with amazing accuracy. However, we found a variation of almost 5° in the location of magnetic north on the old maps compared with its direction on recent USGS 7½ minute quads.

Two sets of U. S. Coast and Geodetic Survey vertical aerial photography, scale 1/36,000 and 1/20,000 were located which imaged the area. Much has happened in the last 100 years, of course. Whole generations of trees have been cut, regrown, and cut again. Stereo study proved vital for all but a crude basic analysis of the available photography. Many of the significant, but very subtle, tonal variations upon which good photoarchaeological analyses depend were lost in the gray tones of the black-and-white photographs. Large features such as the major gun emplacement, the remains of the HBC farm and the houses where Cutler and Pickett, lived could be located with little difficulty. Other features, including

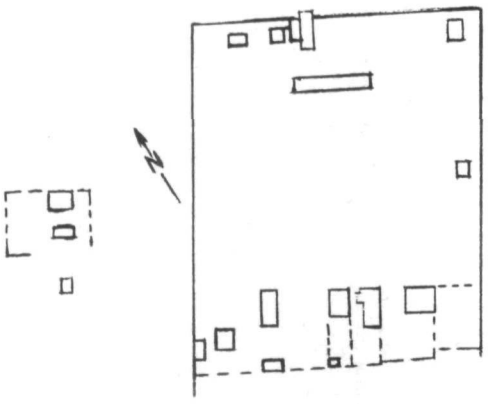


FIG. 5. Several permanent buildings were built in the American Camp. The original of this map was drawn in 1874. It shows the locations of several of the buildings that were in use as of that time. Traces of many of them can be seen on the ground, and most of them can be located through careful study of natural color and color-infrared stereo photographs. Convergent oblique photographs proved to be very valuable. The lower edge of this map fronts on American Camp Road.

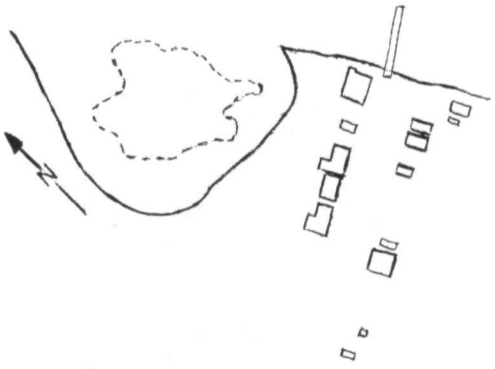


FIG. 6. San Juan City was a bustling place in spite of its small size. Military supplies were brought ashore at the pier. Cutler's store, warehouses and the inevitable saloon complex catered to the soldiers' needs.

foundation scars from major structures had been masked or obliterated over the years.

Convergent oblique natural color, color-infrared, and both natural color and color-infrared stereomultiband photographs were obtained from 1,500 and 3,000 feet. Coverage was obtained from the four cardinal directions imaging both the American and English Camps. The suspected route of the military road was studied in stereo, examined visually from the air, and photographed using convergent oblique stereo techniques parallel with the long axis of the route. This was done to penetrate under the edge of the tree canopy and to assess continuity of irregular growth habit in the vegetation. Two expected routes for the military road out of American Camp were located (Figures 7 and

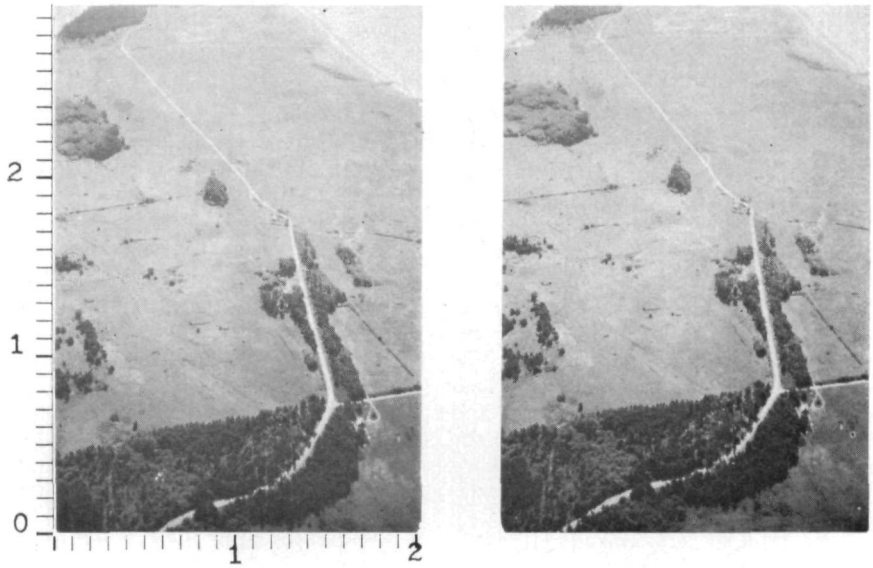


FIG. 7. Looking south from American Camp. The convergent oblique stereogram was assembled from natural color originals taken from 3,000 feet. The HBC post is located at coordinates 155/170 and Pickett's monument and bastion at 100/201. Rectangular traces such as those centered at 090/110 are foundation scars.

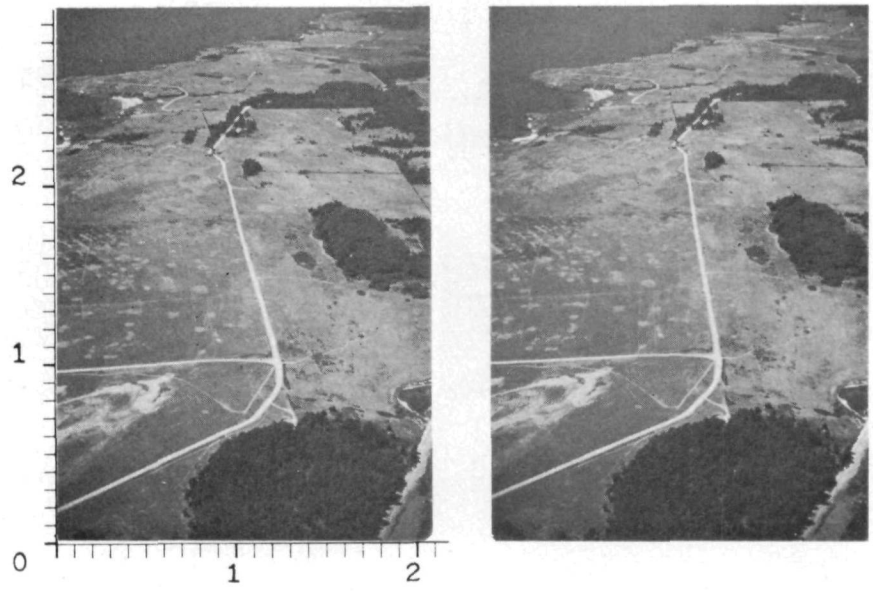


FIG. 8. Looking north from American Camp from 1,500 feet. Earthscar patterns can be seen in the camp area. The barracks were located in front of the woods at coordinates 110/210, across from the bastion. The HBC post is located at 060/220. The head of the San Juan City pier is at 200/030.

8). A major problem was that, as the area has been logged extensively, logging trails and skid roads criss-cross the area. The dominent characterisitics searched for in looking for the military road were those indicating continuous use and evidence of special construction. All possible stream crossing sites were examined closely for evidence of reinforced bridge footings and paved fording areas and ramps (Figure 9). One section of the old roadway was spotted from 750 feet which appeared to be a *plank road*. As any combat aerial observer can confirm, this sighting was made at the "usual time"—just after I ran out of film. We landing, I got more film and went airborne again, but couldn't find the critical area the second time from the air! (It was found on the ground later, though).

Conditions in the English Camp are in much better repair than they are in the American Camp (Figure 10). When the

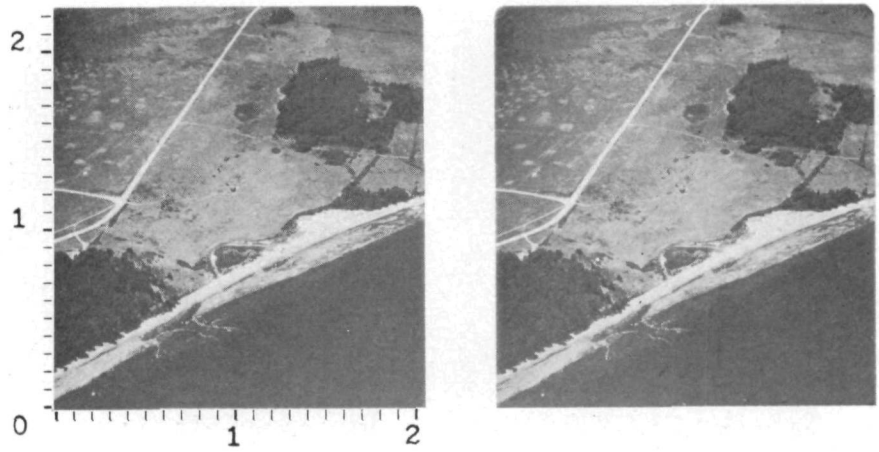


FIG. 9. All that remains of San Juan City that can be seen clearly from the air are scars of the pier head (070/050). The natural color originals used to assemble this stereogram were taken from 3,000 feet. Most of the foundation scars are masked by the trees.

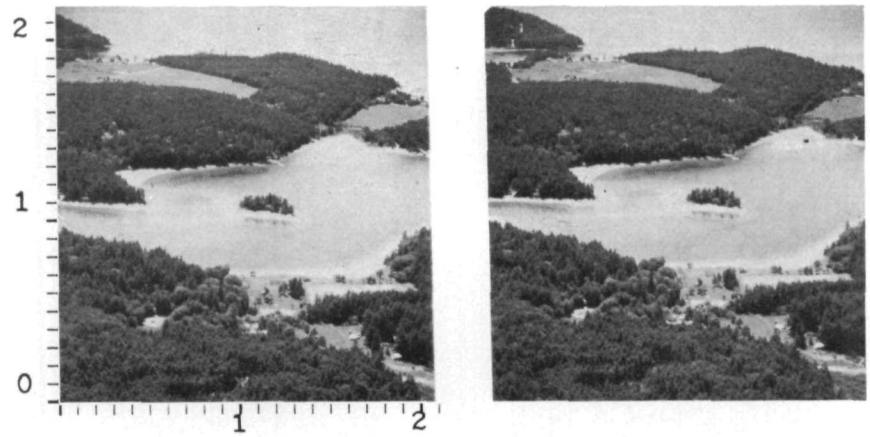


FIG. 10. One hundred Royal Marines were stationed here from 1859 to 1872. Their blockhouse, at 115/080, is in good repair (Figure 12). The barracks still stands and the cemetery is tended regularly. This stereogram was assembled from convergent oblique natural color photos taken from 3,000 feet, looking west.

English Camp was evacuated in 1872 it was purchased by a Mr. Crook, a gentleman of Canadian ancestry. He maintained the area, including caring for the cemetery in which several Royal Marines are buried. The American Camp was abandoned in 1874, many of the buildings were destroyed, and in time all were gone. (Figure 11).

FINDINGS

Subtle differences in the height of vegetation and minor variations in surface configuration sometimes mark archaeologically important sites and features within sites. Several such sites were located within the American Camp area and in the site of San Juan City. Foundation scars were located at each site where buildings appear on the 1874 map, plus several other areas. One row of apparent foundation scars at the foot of a rise may mark the area where Pickett's men pitched their tents when they first arrived.

Several linear breaks in the forest cover could be interconnected. These appear to follow the most feasible route for the military road. (Figure 12).

Low-level, convergent, oblique stereo photographs taken so that one could examine the ground under the edges of the overhanging tree canopy were very valuable. Hyper-

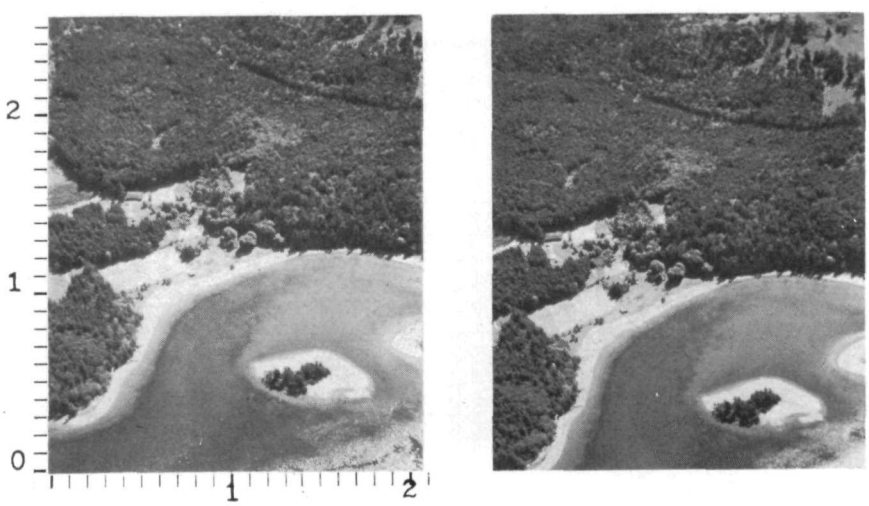


FIG. 11. English Camp, looking east from 3,000 feet. The blockhouse is located at coordinates 105/120.

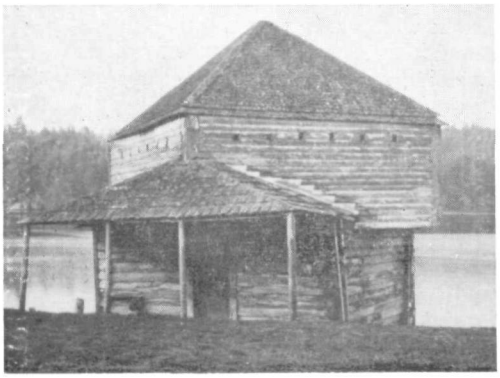


FIG. 12. The wooden blockhouse that the Royal Marines manned is a classic historic monument. It is one of the few still standing.

stereoscopy was obtained by convergence of optical axes 10°. This was very effective in detection of vegetative anomalies in grassy areas. Many of these sites were so subtle that they were almost invisible from a distance of 30 feet on the ground.

Color-infrared photographs were not as effective in this project as in previous photo-archaeological analyses undertaken by the author. Color-infrared was obtained using a Wratten 16 filter. This filter has been the most effective one used in analyses in Maryland, Virginia, South Dakota, Pennsylvania, Minnesota and California. Stereomultiband photographs were obtained using my personal multiband camera. Color-infrared stero-multiband photographs were obtained using a Wratten 16-61 combination. This combination has been good for archaeological support in the San Francisco Bay region. Natural color steromultiband photographs were obtained using Wyatten 2A/2E and 8/9 filter combinations. Notable differences were noted between imagery in the frames even though only minute differences exist in spectral transmission. Taking advantage of these differences may prove valuable in other regions; however, they were of only minor value in this project. Had we been searching for crop marks it is likely that these special photographs would have been very valuable.

CONCLUSIONS

This project was significant for several reasons, the most important reason, of course, being that it may play a part in preserving our national heritage for the knowledge, enjoyment, and benefit of future generations.

From a remote sensing standpoint, four valuable findings were:

- The value of low-level, convergent oblique, stereo, natural-color photographs using a narrow-angle lens was reconfirmed.
- The value of correlation of features imaged in black-and-white vertical photographs with their images as recorded in the color stereo obliques was reconfirmed.
- The value of stereomultiband photographs obtained using natural color film where only a slight difference exists in the transmission of the two filters appears to have significant potential.
- The value of oblique hyperstereoscopy was reconfirmed.

ACKNOWLEDGMENTS

Several key persons in the National Park Service deserve commendation for the assistance which was given. Chief Archaeologist Paul J. F. Schumacher and Miss Astrid

FIG. 13. Park Superintendent Carl R. Stoddard and Ranger Marvin Sharpe on top of the bastion pointing out the Park features to a visiting archaeologist. The inscription on the monument reads, "First Officer in Charge was Captain George E. Pickett of Ninth U. S. Infantry."

Willsrud, Archaeologist, provided invaluable technical guidance. Mr. Carl R. Stoddard (Figure 13), Superintendent, San Juan Island National Historical Park, and Ranger Marvin Sharpe provided valuable assistance in the field, Lieutenant Commander Charley Chapman (CEC) USN, USNAS Whidbey Island, Washington, volunteered his services as a pilot and flew with me on his own time in a light aircraft to obtain the hand-held photographs which were taken.

My long time friend, fellow Marine and associate, John T. Smith, helped me locate the USC&GS file aerial photography of the area. Special help was provided by my associates, C. W. Salisbury, Masao (Bud) Uyeda, and Steve Whitmer. We worked together as a team in both the interpretation and in preparation of the project report.

Reprinted from
PHOTOGRAMMETRIC ENGINEERING
NOVEMBER
1972

Photogrammetric Engineering, Vol. 33, No. •
1967

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Photoarchaeology

Reconnaissance tests using color, as well as other films, indicate that exploration studies may be reduced from months to hours

ABSTRACT: *In the spring of 1965, the Itek Data Analysis Center conducted a photoarchaeological investigation for the National Park Service. The objectives of this investigation were to determine what type of film, black and white IR, pan-minus-blue, natural color, or color IR, was best suited for detection of archaeological sites along the Missouri River in South Dakota. Coverage was obtained at several scales, and compared with pan-minus-blue scale 1/20,000 USDA photography of the same area. We concluded that natural color and color IR, scale 1/10,000 provided the best interpretation medium, considering the saving in time which these mediums provided.*

INTRODUCTION

ABOUT 130 YEARS BEFORE Columbus landed in the New World, the inhabitants of the village site shown in Figure 1 constructed bastioned fortifications, surrounded by dry moats. This site is located in Lyman County, South Dakota, about 22 miles south of Pierre, the state capital. During this same period in history, my ancestors from southern Sweden constructed similar fortifications in Finland, Western Russia, and other areas then under Swedish control. I bring this point out because this similarity, and other evidence, tend to prove that early Norse explorers visited the New World between the year 1000 AD and at least as late as 1362 AD. This thesis is controversial; particularly to Italians as evidenced by their reaction to the Vinland Map. I reopen this controversy, however, because many bits of evidence, for which archaeologists have no satisfactory explanation, indicate the possibility of late Viking age Scandinavian penetration into the middle of North America. Mysteries of this kind are examples of the types of problems which may be solved through the proper use of aerial reconnaissance, termed here *photoarchaeology*, a scientific tool which is made more interesting and effective when color and false color photography are employed.

The full extent of the village site shown in Figure 1, for example, was not known within the Smithsonian Institution's River Basin Archaeological Salvage Program until it was discovered by photoarchaeology in the spring of 1965.

Photoarchaeology is similar in many respects to ground combat tactical photointerpretation. In both instances interpreters are usually searching for small camoflaged installations in rural terrain. The camouflage, in the case of archaeological sites, is generally harder to pierce. It is truly natural camouflage, emplaced over a span of many years,

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* Presented at the Annual Convention of the American Society of Photogrammetry in Washington, D. C., March 1967.

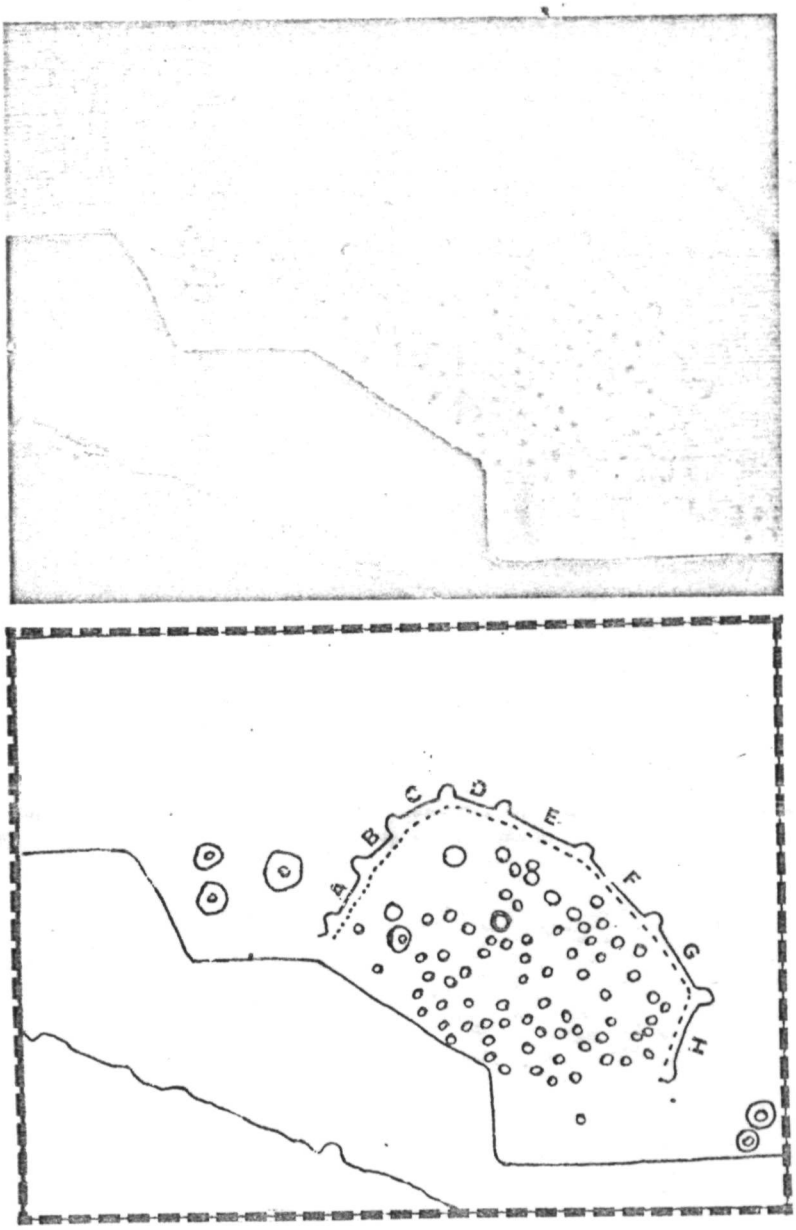

FIG. 1. This photo and accompanying sketch map illustrate the present-day appearance of a fortified village site, classified as Pre-Arikara. The solid outer line on the sketch map marks the location of the moat. The dashed inner line marks the location of the palisade. The smaller circles mark the locations of the older houses which were occupied at the time that the moat and palisade were actively defended. The larger double circles mark the locations of more recent Indian earth lodges. Residual traces of these features can be seen in the photo. The distances between the centers of the bastions are:

A—124 feet	C—129 feet	E—209 feet	G—195 feet
B—121 feet	D—135 feet	F—218 feet	H—202 feet

sometimes hundreds or even thousands. In the case of infantry tactical photointerpretation, detecting critical images under camouflage requires that the proper sensors be used, and that interpreters have knowledge, understanding, and experience. These same requirements exist in photoarchaeology.

THE PROJECT

In the spring of 1965, the Itek Data

Analysis Center, under contract to the U. S. National Park Service, undertook a field reconnaissance project in cooperation with the Smithsonian Institution to determine what type of aerial photography, black and white IR, normal pan-minus-blue, natural color, or color infra-red, yielded the best results for photoarchaeology. The critical factors of scale and time of day (because of the impact of sun angle on shadow length) were also evaluated.

Test Area

The test area selected is located south of Pierre, South Dakota, along the Missouri River, as shown in Figure 2. This area was selected because much of it is being flooded by dams, and concerted efforts were underway to salvage as many bits of American pre-history as possible before critical sites were covered by mud, silt, and water, and lost for all time. This area has been continuously inhabited for thousands of years. The earlier cultures are classed as Woodland, and are believed to have been largely nomadic. No evidence of permanent villages has been found dating to the Woodland cultures along the Missouri River The Indian and/or pre-Indian inhabitants seem to have developed an essentially settled agricultural form of culture about the year 1000 AD. Squash, corn, and beans were staple food items, supplemented by meat from buffalo and other native animals. Fish were also probably included in their diets.

The native inhabitants of this area built earth and log houses of three types during the span of years extending from about 1200 AD to the start of the 20th century. These houses have long since collapsed, leaving residual

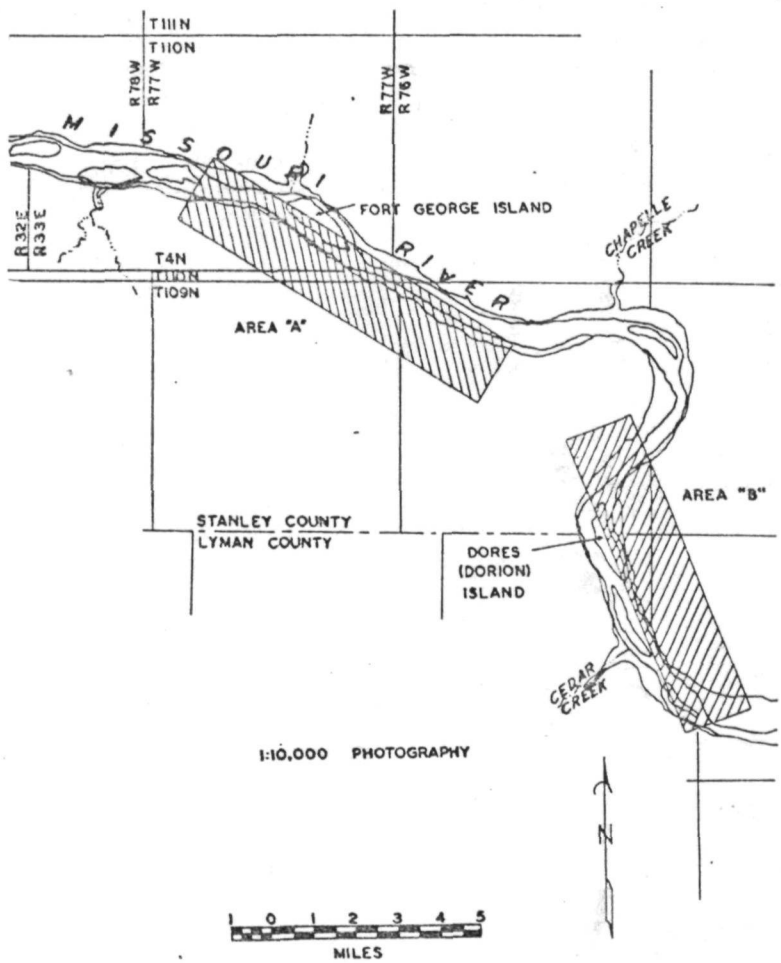

Fig. 2. The test area is located south of Pierre, South Dakota, along the Missouri River as shown in the photo cover diagram.

house pits. Some of these houses were accompanied by cache pits for the storage of food as shown in Figure 3.

Village fortifications progressed through three stages. Fortifications which were constructed about the time of the Kensington Rune Stone, of Norse origin and dated 1362 AD were bastioned, as was shown in Figure 1. The bastions were, in my opinion as a bow hunter, too far apart to have allowed mutually supporting enfilade fires using bows of the type used by Plains Indians during the historical period. Scandinavian long bows or crossbows were another matter. Indian villages of this period are termed *Hull Focus* and sometimes as *Middle Mandan* sites. Later, when the possibility of European contact was less likely, dry moats were constructed, but bastions were omitted.

The native inhabitants of this area are termed *Pre-Arikara*. The Arikara was the principal tribe that lived in the area at the time the French explorer Verendrye arrived in 1732. The Mandans also lived in the area. Verendrye reported that the Mandans were taller, and that about 7 per cent of them were blond and blue-eyed, which may offer another clue to the origin of Viking-like fortified villages.

Test Procedure

A coordinated aerial photographic flight program was conducted, aided by extensive field work. Flight lines over areas of interest on both sides of the Missouri River were set, and comparative aerial photographic coverage was obtained. The area on the west side of the Missouri was quite well known. Two *digs* were being conducted in the area along the west bank in the spring of 1965. The area along the east bank of the Missouri was scheduled for detailed exploration in the spring of 1966.

Photographic Operations

Vertical photography was obtained along both flight lines from three altitudes: 1,500, 2,500, and 5,000 feet. Four types of film were used: (1) Kodak Infrared Aerographic type 5424; (2) Kodak Plus-X Aerographic, type 5401; (3) Aerial Anscochrome D-200; and (4) Kodak Ektachrome Infrared Aero, type 8443. A Wratten 25 (red) filter was used to obtain modified infrared. A Wratten K-2 filter was used with the type 5401 film to obtain pan-minus-blue. Zeiss filters equivalent to the Wratten 2B and Wratten 15 were used to obtain the natural and false-color photography, respectively. One flight using the pan-minus-blue combination was made early in the morning when the shadows were long, thereby accentuating positive vegetation marks.

A Zeiss RMKA Camera (six-inch focal-length lens) was used. A portable resolution target was emplaced near the camp where the Itek personnel and the Smithsonian teams lived. Field work included soil sampling for soil color and acidity determination. Low-altitude low-oblique photos were obtained using a Nikon F 35 mm. Camera with a Micro-Nikkor lens, and with a Nikon S-2 with a Nikkor-SC 50 mm. F/1.4 lens, from a Cessna 172 airplane. Oblique photos were obtained using Kodak SO-243 High-Definition Aerial film with a Wratten 16 filter, Kodachrome II using a Wratten 2A filter, and with Kodak Ektachrome Infrared Aero, type 8443, using both a Wratten 15 and a Wratten 32+2A filter combination.

Extensive ground photography was obtained to support the aerial photointerpretation phases.

Photointerpretation

Interpretive analyses were made, comparing the project photography with existing USDA scale 1/20,000 pan-minus-blue coverage which had been flown three years earlier in the fall of 1962.

All photography was interpreted at the Itek Data Analysis Center facility in Alexandria, Virginia. Comparative analysis were made using an Itek AM-4 Variable-Width Rear-Projection viewer, Zeiss mirror stereoscopes, Union Instrument folding stereoscopes, and related equipment. The film types were evaluated against each other to determine relative image content and ease of interpretation. The ease of detecting and identifying images of archaeological significance at different scales was evaluated by comparing the number of sites detected, and the density of detail which could be identified.

Findings

In the course of our analyses, we found every site which had been found by professional archaeologists on the ground over a fifteen year period. We found a few additional sites which had not been found in field study. One of these was the fortified village shown in Figure 1. In addition, an Indian grave was discovered—the first burial site to be discovered in the area. These findings should not be misinterpreted to mean that photoarchaeology can replace field work; it cannot. The two must go hand-in-hand.

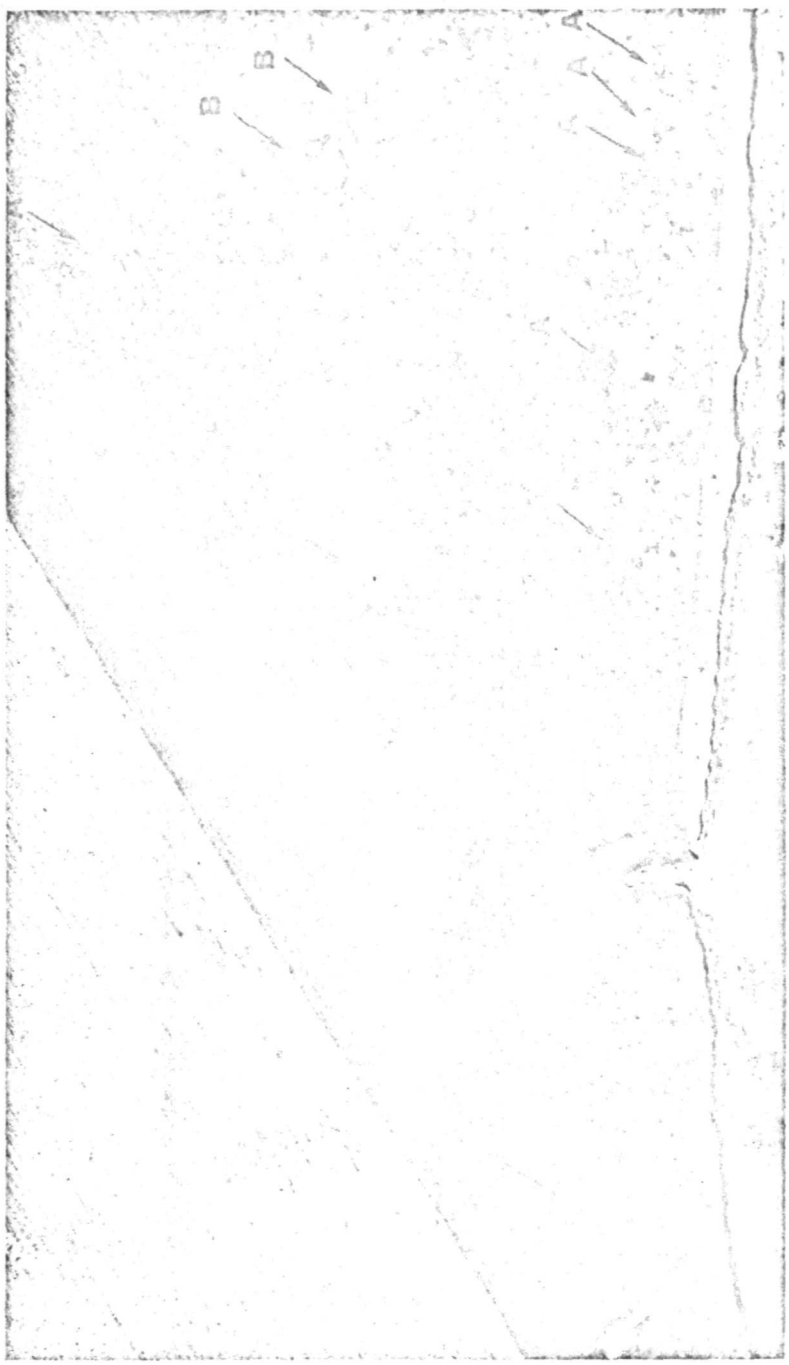

FIG. 3. This photo illustrates the appearance of typical earth lodge traces A without cache pits and B with cache pits. The site with cache pits near the center of the photo has been excavated. The small white patches in the field are ant hills. They average about six feet in diameter.

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FIG. 4. This photo shows the circular images which mark the former locations of haystacks. These images resemble the dark images which are created by the denser vegetation in the centers of house pits. While they look almost alike in pan-minus-blue photography, they are strikingly different in infrared—particularly color infrared—photography. The rectangular excavation, incidentally, marks the remains of Ft. George, a "whiskey trading" fort which was established in 1840.

Many of the sites could be located on the 1/20,000 USDA photography, and almost all of them on the 1/10,000-scale pan-minus blue photography that was obtained for the project. The modified infrared was much less useful than had been expected.

The major advantage found in the use of the color infrared photography was the improvement in interpretation accuracy. Some circular patterns which looked like house pits in the pan-minus-blue photography were found on re-examination to the earth scars which remained following removal of haystacks. Six of these circular patterns are shown in Figure 4. The similarity of these patterns to the dark center pattern of house pits can be seen by comparison with Figure 3.

The principal advantage of the color and color-infrared photography was that it simplified and speeded-up the interpretation.

CONCLUSIONS

Photoarchaeology can be a valuable tool for archaeological reconnaissance. Field exploration which may otherwise take months to conduct can be performed in just a few hours by stereo study of vertical aerial photography; we believe that this is a general conclusion. Regarding the specific types and scales of aerial photography, our conclusions are limited to exploration along the Missouri River. In that area we conclude that pan-minus-blue at 1/10,000 scale is adequate for preliminary reconnaissance, considering time and cost factors, and the convenience of being able to take paper prints and a folding stereoscope into the field. For more detailed reconnaissance, particularily in inaccessible areas which cannot be field checked conveniently, color infrared photography at 1/10,000 scale is preferred.

FIG. 3. This photo illustrates the appearance of typical earth lodge traces A without cache pits and B with cache pits. The site with cache pits near the center of the photo has been excavated. The small white patches in the field are ant hills. They average about six feet in diameter.

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(John Wiley and Sons)

ABSTRACT

Photoarchaeological Support
for Restoration of
Fort Frederick,Maryland

The military facility that was the strongest stone Fort on the "Western Frontier" during the French and Indian War is located less than 2 hours from Washington,D.C.

George Washington MAY have been the Colonial Officer who cunducted the surveying for its construction.

Construction of Fort Frederick started in 1756.

The Fort was built by the colony of Md. to protect the "Western Frontier" and area where we now stand from French forces and their Indian allies.

It played a major support role the defeat of French forces in this region.

The Fort played an important role in the American Revolution,also.The fort was used by Colonial Forces as a Prisoner of War prison,or as a POW camp.

It was the place where English and Hessian soldiers captured during the Battle of Saratoga were confined. also Yorktown prisoners.

The Fort played a role in the Civil War,also,blocking Confederate Forces from proceeding North prior to the Battle of Gettysburg.

Fort Frederick's long role in the history of the United States was recognized during the American Bicentenial

celebrations in 1975-1976,when the Fort was selected for partial restoration as a major American Heritage site.

Even though the Fort wall had been restored by the Civilian Conservation Corps (CCC) in the 1930's,more work was needed to prepare it for the Bicentenial.

Accurate restoration of Fort Frederick required ? that the source of the stone used in the original construction be located.

Aerial photographic interpretation methods were used to study the Fort and the surrounding area to see of additional historical archaeological features could be discovered,and particularily for location of the quarries from which the stone used in construction had been obtained.

Corrrelation of magnetic anomalies detected with a metal detector with significant images in aerial photographs was confirmed.

Several very small abandoned stone quarries were located on Fairview Mountain,which is outside of the study area.

Rock from which building stone that corresponded with the color,grain size and texture of the stone used in the original construction of Fort Frederick were located in these quarries

? compare with D. Reed's analysis. See APT article.

grass cutting pattern An additional important discovery was the foundation traces of a possible fourth building,whose size and orientation indicate three,rather than two barracks within the walls of the Fort.

Area scraped & regraded by CCC If it was a building,the structure appears to be the same as either a third "Enlisted Barracks",of the size and form reconstructed for the BiCentenial,or one in the form of the "Officer's Barracks",which was the Fort "Headquarters",positioned between the East and West "Enlisted Barracks".

A third building may have been part of the original fort,considering the military organization of the English forces during the 18th Century.

A third barracks may also have been constructed during the Revolutionary War,to house additional English and Hessian prisoners of War,or during the Civil War,to house Union Soldiers also.

FORT FREDERICK

Fort Frederick is a classic 18th century stone fort that appears "out of place" in 20th Century Western Maryland,until you delve into its fascinating history.

FIGURE 1 is a vertical aerial photograph showing Fort Frederick,as it existed on 20 April 1974,at the start of this project.The original photograph was color infrared,scale 1:3,000.

Fort Frederick occupies a unique place in American History.One of the strongest Forts on the Western Frontier during the French and Indian War,its presence helped shape our colonial heritage.

This report summaries work undertaken for the Maryland Department of Natural Resources in support of the "Tentative Program for Archaeological Reserch at Fort Frederick,Maryland",one phase of Maryland's contribution to a better understanding of American History.Key features of the Fort were restored for the benefit of all Americans,as we prepared for our 200th birthday as a Nation in 1976.

I had the honor of being the aerial photographic interpreter with formal training in the field of archaeological anthropology who was honored to conduct the photoarchaeological phases of the reconstructive work.

This project started with a review of the history and of the geographic setting of the region.From this,and from conversations with Dr.Tyler Bastian,State Archaeologist,and others,a set of "search objectives" was prepared.

HISTORICAL SUMMARY

Photoarchaeological study of an area requires regional and subject background research.

Only some of the important features which are known to have existed in an area will be found.The writer has found that the best approach is to study an area thoroughly following a review of historical record data to locate as many of the features as still exist as possible. Then,extending from this base of known facilities,search for other features which may be significant.

As an initial step,the writer prefers to collect all record data and summarize it to develop a narrative record of the historic period.From this,a set of search objectives is prepared.

NARRATIVE RECORD

FORT FREDERICK

Governor Horatio Sharpe was Governor ~~General~~ of Maryland during the French and Indian War.A former Captain in the Royal Marines,he must have received some training and perhaps some combat experience in defense of port and harbor facilities.Later,as a Lieutenant ~~Colonel~~ of Light Foot,analogous to being an infantry officer,he saw service in the Indies.In this capacity he must have gained further training and experience in the defense of critical land areas and regions.All of this training and experience was probably called on in developing the Western defense of the Maryland frontier.

Sharpe was appalled by the vulnerability of wooden forts and log stockades.His concern was sharpened by Braddock's defeat in July,1755,and the burning of one or more British forts by the French and their Indian allies.To protect the vulnerable region along the upper Potomac,he laid plans for the replacement of the several wooden forts in the region (one of them being Fort Tonoloway,near present-day Hancock Maryland) with two stone forts,in addition to Fort Cumberland.One ~~of~~ these forts was to be Fort Frederick.The other,a smaller fort,was to be built on North Mountain.Fort Frederick was designed (perhaps by Sharpe personally) as the key defensive feature in the region.

? Ft. Fred. is the one on No. Mtn. (now Fairview Mtn.) see over →

Ancestors of many famous men participated in the building of Fort Frederick.The assistant commander of the during at least part of the construction phase was Captain Alexander Beall,an ancestor of U.S.Senator J.Glenn Beall Sr.,who introduced the original legislation for creation of the Chesapeake and Ohio Canal National Historical Park (abbreviated "C and O Canal" hereafter in this paper),and of the Interpretive Centers along the C and O Canal,which passes near Fort Frederick.Current legislation (Senate Bill S.1766 introduced by Senator Charles McC.Mathias,Senior Senator from Maryland),calls for establishing and naming the Interpretative Center at the Cumberland Terminus of the C and O Canal after Senator J.Glenn Beall Sr.,and if you choose to visit Fort Frederick,I recommend that you take advantage of these National Park Service facilities,as well as the installations created and/or restored by the State of Maryland.

After Governor General Sharpe decided on the need for the stone forts,survey and site selection work started.The survey work has been credited to a young officer who served in the Colonial Services from Virginia,Major George Washington.Major Washington had been one of the officers assigned to "pick up the pieces" after Braddock's defeat in the summer of 1755.Whether the site was actually <u>selected</u> by Major Washington or not is unknown.

Sharpe was by far the older and more experienced military officer. It's unlikely that Washington had much to offer Sharpe.

Sharpe wanted to build one strong fort at present day Oldtown, near Cumberland, but the legislature wouldn't give him the money unless he relocated it to No. Mtn. Perhaps these facts led to the mistaken notion of 2 stone forts.

FORT FREDERICK

Construction of Fort Frederick started in 1756,and the fort remained a strong point in the Colonial defensive network until the end of the French and Indian War.The fort was the center of activity during the conquest of Fort Duquesne.In 1759 ,records cite that a village of at least 18 houses (or other buildings) had been constructed in the vicinity of the Fort.One or more taverns may have existed,as did a sutler's store.Inside the walls of the fort,there were at least two large enlisted barracks (measuring about 118 by 17 feet, ~~[illegible]~~ with porches) and a larger "Officer's Barracks" which served as the Headquarters Building.The Enlisted Barracks were large enough to house at least 300 men,apparently organized into two companies of of four platoons each (22 men per platoon).A stockade or other defensive outworks may have been built.Several men are reported to have died.A graveyard or other place or interment must have been installed.It appears likely that a hospital facility must have existed as well.Boat landing,fords,or other river transit facilities must have existed.Roads and trails and stable facilities must have existed.It is reported in the literature that a garden may have existed.

Doubtful, see Townsend (1977).

The military value of Fort Frederick declined as the frontier moved westward.It surged back into importance at the time of Pontiac's Rebellion in 1763,then submerged back into history only to reappear in an entirely different role-that of a military prison,or perhaps better discribed as a "POW" camp.In this role it was the place of confinement for many British and ~~Hessian~~ Coerman prisoners of war who had been captured during the winter of 1777 following Burgoyne's defeat at Saratoga.Additional prisoners of war who had been captured at Yorktown in 1781 were confined here also.

In 1791 the fort was sold at public auction,and remained in private hands until 1922,when it was re-purchased by the State of Maryland for the creation of Fort Frederick State Park.In the intervening 131 years its only military role was a short one during the early years of the civil war,when it was occupied by a company of Union Infantry,on perhaps two occasions.During this period a hole appears to have been broken though the south curtain wall for the installation of a field piece of unknown caliber.

Extensive research has been conducted regarding Fort Frederick,but many questions remain unanswered.These concern not only the Fort itself,but many of its ancillary features.

Historical records are sketchy,at best.

Landmark features have been altered with the passage of time.

The walls of the fort were reported to have been 17 1/2 feet high originally.

By the time the fort was re-acquired,the walls had crumbled,and a wagon gate had been cut through the north wall.

Only token reconstruction was possible for many years.

During the 1930's,reconstruction was sparked by National Park Service interest and the assignment of Civilian Conservation Corps (CCC) personnel at the fort.The CCC camp was manned and in operation at Fort Frederick from 1934 to 1937.Among the many works undertaken by CCC's in the region was some (unfortunately questionable) archaeological work,and the re-building of the walls to their original height and thickness (17 1/2 feet high,41/2 feet thick at the base,and 3 feet thick at the top).

SEARCH OBJECTIVES

The following list of search objectves was compiled to guide my archaeological research.

Efforts were made to locate each item on this list in the aerial photography,followed by confirmation of their identity on the ground.

1.Each of the features shown on the Park Map and the tour diagram.
2.Foundation traces of buildings which are reported in the literature.
3.Rock quarries and routes of communication from them to the fort.
4.Evidence of outer defense works,including a glacis and stockade
5.A cemetery
6.Barracks or quarters for prisoners.
7.Traces of a barnyard joining northwest bastion.
8.Traces of earlier archaeological "digs".
9.Traces of "a fourth stone foundation just outside of the northwest bastion" cited on page 15 of "Tentative Program".
10.Latrines and refuse pits.
11.Evidence of a tower on the west side to watch prisoners cited on page 18 of the "Tentative Program".
12.Traces of " Two old buildings in the field" cited on page 2 of the "Tentative Program".
13.Evidence of "Village of 18 houses" cited in the Journal of James Kenny,on page 7.
14.Small building near southwest bastion shown in Photo No.484A.*
15.Evidence of CCC tent camp shown in Photo No.482.*

16.Headquarters of CCC tent Camp shown in Photo No.482.*
17.James Long's house (presumed tobe a tavern.May have had defensive works associated with it.*
18."Sutler's Store (cited on page 35.*
19.Garden and/or other food production facilities (including fishtraps (called "fishpots" in contemporary literature).*

*Taken from "Fort Frederick Restoration -Report on Historical Research" by Ross M.Kimmel,and on ground photos provided by Maryland Department of Natural Resources.

One key part of the field work was on-site verification ("ground truth").Another key part was taking additional aerial photography.Both natural color and color infrared convergent oblique stereo aerial photographs were obtained.

This was followed by obtaining natural color,color infrared (CIR),and CIR stereomultiband oblique aerial photography.

Much of the aerial photography taken during this phase was obtained using 35mm cameras.

"Stereomultiband" aerial photography,as used here,is used to discribe aerial photogrpaphy that I began taking in 1960 using a modified Nikon Stereolens,adapted to mount different filters over each lens.Some spectacular and very interesting results were obtained.

The procedures which were used and the findings which were made are summarized in the following paragraphs.

PHOTOARCHAEOLOGICAL METHODS USED

A preliminary stereo-analysis was made of the entire region.Black-and-white (pan-minus-blue) vertical aerial photography was provided by the Department of Natural Resources,State of Maryland.

This photography was taken in 1958,1967,and 1969.

These photographs were:

1.USDA (Scale 1/20,000) AHB-7T-118 through 121,taken 9 August 1958.

2.Mission marked 459-6,taken 25 March 1967,scale 1/12,000.

3.Mission marked 753,taken 8 April 1969,scale 1/12,000.

Some excellent ground and aerial oblique (non-stereo) photos were provided also.

The study area was delimited on a section of the Big Pool USGS 71/2 minute Quadrangle,and specified in a letter from the State Archaeologist as being the area within 3/4 mile of the fort itself.Since the aerial photography which was obtained covered a much larger area,however,the writer extended these limits to aid in placing the region in better geographic and historical perspective.

Following the initial study,it became appparent that very large scale vertical color infrared aerial photography RF 1/3,000 (250 feet per inch) was required.

I specified scale,time of day and season and flight line orientation desired.

Black and white color transform negatives were made from the color infrared transparencies using a Log-E-Tronic printer.Contact prints were made from the transform negatives to assemble an index mosaic and a set of stereostrip mosaics covering the study area.These were used as a ploting base to facilitate ploting of data collected from interpretation of the color infrared positive transparencies.

The photography,which was excellent for the purpose intended,was flown to my specifications (for the Maryland Department of Natural Resources) by Photo Science,Inc.,at Gaithersburg (Maryand) Air Park.

SEASON

Time of year is very important in selection of remote sensor imagery for photoarchaeological reconnaissance.

It is recognized that plant growth rate may be altered when the soil is desturbed.Buried objects or substances accelerate or retard plant growth.These effect may help disclose the presence of buried objects.If evaluation of differential growth rates is important potentially,as in this project,remote sensor imagery should be obtained at the start of the growing season.

Underground features will then be disclosed by the presence of "positive" or "negative" vegetation anomalies

The writer has observed that in Western Maryland differential growth patterns are most distinct in mid April (when the normal climatic condtions exist).At this time,leaf cover will not have matured,and the ground can still be seen in most wooded areas,also.These conditions were discussed with Photo Science.The photography was obtained by them on 20 April,and is excellent for the purposes intended.

Color infrared aerial photography was selected for use in this project because of its unique ability to image differences in vegetation growth state,rate and habit.

ON-SITE VERIFICATION ("GROUND TRUTH").

Standard archaeological field methods,including visual examination,comparative photographic interpretation, ground-conductivity measurements and use of a metal detector to search for magnetic anomalies were employed to verify the existance of conditions which had been discovered by image analyses.

Ground truth operations should be undertaken as soon as possible after the aerial photography has been taken.This is particularily true in the case of photoarchaeological analyses,because of the potential importance of differential growth rate pattern analyses.

Weather conditions are critical for obtaining suitable low-level aerial photography.

Haze is a problem that aerial photographers must compensate for,and haze conditions of serious proportions are a "fact of life" from the mountains of Western Maryland through the "Great Smokies" during the month of July.Haze conditions were acceptable on 3 July,but deteriorated rapidly from that time.Really good conditons did not occur again until 14 July,after a light rain.Conditions did improve to the "marginal" level on 7 July,however,and a flight was made in which some 35mm color infrared oblique stereo coverage was obtained.

The unavoidable delay from 20 April when the vertical aerial photographs were taken until I was able to arrive on site on 3 July permitted differential grown patterns to be lost.The area within the Fort had been mowed several times between 20 April and 14 July when the natual color 35mm

oblique stereo aerial photography was taken.In addition,tree leaf cover and ground cover in non-landscaped sections of the Fort Frederick State Park had become so dense that features,if they could be seen at all,had been changed in appearance.A heavy crop of poison ivy was found in several areas which should have been checked carefully.This impaired surface collection search for artifacts.

As has been stressed,the lawn had been mowed several times inside the walls of the fort.This appears to have altered the rectangular patterns which may mark buried building foundations.While several rectangular patterns could be seen on the ground,only one of them could be correlated with any accuracy with the imagery obtained on 20 April.This is a long "negative vegetational anomaly".

Mowing creates rectangular patterns.The same basic pattern could be seen over a large part of the landscaped area of the Park.Much of the banded pattern extended from CCC excavations and landscape work in the 1930's.

While this is accepted as true,it appears that mowing operations were the prime cause.

MAGNETOMETRY

Excessive iron in the soil is toxic to many forms of plant life,and it occured to the investigator that nails and other conducting or magnetic materials might be present along negative vegetation anomalies,such as were detected in this (and other) photography of archaeological sites,which might account for reduction in soil fertility.

Excessive amounts of iron,are,for example,a principal cause of the water pollution problems traceable to acid mine drainage.

Aquatic plant life is scarce in acidified streams.

In conflict with this,chelates of iron are administered to some types of plants that suffer from chlorosis.It was reasoned that either the presence or complete lack of a magnetic response might indicate the presence of foundations for footings.In addition,of course,the discovery of any metal artifacts in the study area might be important.

Extending from this thinking,it was decided to investigate the use of a metal detector to improve "ground truth" analyses.

Prior to leaving California,contacts were made to check for possible magnetic or earth conductivity anomalies which might confirm or deny the exisance of underground artifacts.

Contact was established with the Metrotech Division of Dictaphone Corporation,who maintain offices and manufacturing facilities in Mountain View,California.This firm manufactures some of the best known instruments used at that time by public utility agencies for detection and location of water lines and valve boxes.

Tests were conducted with the Metrotech 220 to confirm the potential value of this instrument for archaeological reconnaissance.

An area about 18in in diameter in the writer's front yard has been devoid of grass since the ~~year~~ YARD was rototilled in 1972.

When the area was checked with the Metrotech 220,a very strong magnetic response was obtained. The area was excavated,and an iron 5 gallon paint pail lid was found about 12in underground.

This discovery confirms both the impact of buried iron items,and the potential value of this type of instrument for their detection underground.

RICK

ve use had been made of "metal detectors" by the
Applied Science Center for Archaeology,University
vania,in Philadelphia prior to 1974.

was made with Varian Associates,who had developed
eter that had been used for archaeological
tists at Varian recommended that Dr. Elizbeth
sociate Director,Museum Applied Science Center be
Dr.Ralph could not participate, unfortunately,but
ncouraging and recommended steps that shold be

se friends of the investigator have extensive
in the use of metal detectors.Both have developed
rtise in searches for Civil War relics.Mr John
.who is well known in the Society,was one of them.

s a member of the Board of Directors,and was the
tor,Manual of Color Aerial Photography.

ith had long recognized the potential value of use
detector for collection of "ground truth".

friend,Mr.Noel R.Nelson had developed an intense
n such equipment for both historical and
cal research.

h was not able to assist in the initial work at
rick,but suggested methods to be used.

on was able to participate ,however.

time friend,the late Dr.William A. Fischer,who
t time the Advisor,Remote Sensors,Office of the
of the Interior, recommended that contact be
d with the Schonstedt Instrument
n,Reston,Virgina.This was done,and Mr.Charles
ntor of a very sensitive instrument,agreed to

ton offered to assist using the Schonstedt Model
h he had found to be very good in related types of

corresponence with Mr.Erick Schonstedt,President of
y has disclosed that several newer instruments have
pped since this project was completed in 1974,and
s have been refined considerably.

search pattern was undertaken by Mr.Upton and

style of many rural water towers.

c.During The Period in Private Ownership (1791-1922)

Fort Frederick was sold at public auction on 5 September 1791,and appears to have been converted to use as a farm almost immediately.All buildings were probably torn down and salvaged.

It remained in use as a farm for about 70 years.

Fort Frederick was occupied by a company of Union Infantry during the Civil War for a short period,and the "earth scars" could have been created by a "permanent" tent camp.

Traces of the wooden floors of the CCC Camp which existed from 1934 to 1937 were quite visible,and if some substance had been placed on the ground that impacted on the vegetation indications might still be visible after 112 years.

During the period of private ownership,there was a barn built in the northwest bastion.It appears logical that there may have been stock pens or perhaps other farm buildings built within the walls of the Fort during this period. There are indeed photos of such.

There are two areas which are marked by deeper red tonal anomalies in the color infrared. One of these is just inside the north-west bastion where the barn is known to have been located.The other one is about 50 feet away,south toward the gate in front fo the West Barracks.These areas are about the same size,and may mark the locations where animal pens existed.Animal wastes may have improved the long-term fertility of the soil enough to create the "postitive" vegetation anomalies which are indicated (see #7).

d.Reconstruction Period (1922-1969)

This is the period during which the CCC and National Park Service archaeological work was undertaken.

The pattern array could be the result of excavation,filling,and landscaping within the walls of the Fort.One rectangular pattern about 60 feet from the gate appears to be about 2 or 3 inches deep,and is very smooth and regular.See Items #8,#9 and #18 for possible identifications.

e Recent

Evidence of lawn mowing is superimposed on all traces in the "Parade Ground".This has masked them,and altered evidence of differential growth.When examined in stereo,minor differences in the height of some of the rectangles could be

seen.Some of these minor differences may have related to lawn mowing,but others did not.

3.Rock Quarries and Routes of Communications to and From the Fort

As an initial step,the types of rock used to build the walls of the Fort were examined.This was followed by an examination of the geological maps of the area.From this,and as subsequently confirmed in the field,it appears very unlikely that the rock used in the original construction came from the immediate area (within the Study Area).Some possible evidence of old quarrying can be seen near the picnic area.The type of stone in that area (Romney Shale,of the Devonian System) is much different than that used to build the walls of the Fort.

Reed says a lot of it is river rubble.

STONE USED (IN THE ORIGINAL CONSTRUCTION)

Some of the literature describing Fort Frederick included a statement that the stone used is "local sandstone and limestone".

Fortunately, broken samples were available for examination of the type of stone used.

This examination disclosed that much of the stone is a very dense sandstone consisting of quartzite bonded with silica,creating a dense stone resembling Weverton Quartzite.This stone comprises the cap of South Mountain,near Hagerstown.

Several geologists were asked to examine the stone and all agreed with the identification as Weverton Quartzite.Some of the stone resembles grantic gneiss in texture.Some of the stone appears to be dolomite,but does not respond to a weak acid.

LOCAL GEOLOGY

Fort Frederick is located in the Ridge and Valley Province.The bedrock in the immediate vicinity is Romney Shale.The lithology is listed in Table 3,Page 10,"The Water Resources of of Allegany and Washington Counties,Department of Geology,Mines and Mineral Resources Bulletin Number 24" is "shale and siltstone".This material is of Devonian Age,and is quite different from the materials used in the construction of the Fort.

Weverton Quartize is found in the Blue Ridge Province,and is of the Cambrain System.Its lithology is listed as -

"Quartzitic sandstone,hard,dense,some conglomerate beds".

The closest source of bedrock which appears to meet the criteria for construction of Fort Frederick is the Tuscarora Sandstone,in the Silurian System (symbol st on Regional Geological Maps).The closest source of this stone is on Fairview Mountain,outside the study area.

There is evidence of considerable quarrying on Fairview Mountain,however,and this may have included quarying for original construction of Fort Frederick.

The lithology of Tuscarora Sandstone is -"Sandstone,commmonly hard,dense,massive white quartzite,massively bedded in places,and resistant to weathering.

4.Evidence of Outer Defense Works,Including a Glacis and Stockade (#4)

Some evidence of a foreward slope defense including the remains of trenches may exist north and west of the "Trading Post".Subtle patterns can be seen in the photography in the places where the writer,as an infantry officer,would select for establishing a forewrd slope defense in support of the Fort which would permit artillery support with the cannon that was mounted in the northwest bastion.

When the area was checked in the field,a difference in the type of vegetation was noted.

It must be kept in mind that this area was farmed intensively,probably since the area was sold at public auction on 5 September 1791,and that the differences that were noted and the terrain anomalies that exist may be "crop marks".These areas should be checked by others with archaeological training and experience.

5.A Cemetery (#5)

No evidence of an untended Cemetery was found.There is an old cemetery at the Mount Carmel Church at the junction of Shanktown Road and Maryland Route 56.The ages of the graves in the cemetary were not checked,so whether this is the place of interment for "Lieutenant Reilly" and others who may have died at the Fort is not known.

6.Latrines and Refuse Pits

None were noted.There are a few small positive vegetation anomalies in the field toward the farm northwest of he Park boundaries.These may relate to the Fort,but are more likely to relate to the farm and the farm and the type of farming practices being conducted.Diversified farm practices are most likely.These practices include stacking hay,manure,etc.,which could account for the types of patterns which were noted.

no longer there - now park property & site of new visitor center.

7.Other Findings (#19)

a.Two Fishtraps (called "fishpots" by George Washington in writings about the "Powtowmack Company") were located.One of these is about 3/4 mile upstream from the Park boundaries (upstream from the Camping Area).The other fishtrap is located downstream opposite the entry of "Back Creek" into the Potomac.

The upstream trap appears to have been constructed more recently than the downstream trap.This trap is non-symmetrical.One long wing (about 325 feet long) is relatively straight.The separation angle is about 60 degrees.

This angle is broader than most traps which the investigator has discovered.Indications are that the individual stones may have been anchored into position and that their placement was planned and supervised by some one with engineering or surveying experience.This trap appears to have been designed with an enclosure at its apex,to capture and hold fish until they could be removed.This trap should be examined during low water (in September and October)

A very probable major Indian village site is located near the trap.Using the modified Smithsonian System which the investigator recommended at the time that the fishtrps were reported in Frederick and Washington Counties in 1966.

This research and the method recommended is discussed in my paper "Analyses of Ancient Fisf Traps",in the August 1970 issue of Photogrametric Engineering.

Using the recommended system,which is based on the geograhic grid coordinate system corresponding to the USGS 7 1/2 min.Quads of the region,it was recommended that this site be assigned the number 18 WA 755439,at least pending its confirmation.

The second fishtrap is located opposite the entry of Back Creek into the Potomac.It is a symmetrical "V" shaped trap.The wings are curved,narrowing the separation angle toward the apex.The typical small island has been created in the "chute" by the entrapment of brush and other debris.

It was noted that the trees on the West Virginia side of the Potomac exhibit a rectangular pattern which may stem from differences in fertility.On close examination of the 1974 photography,it appeared that there may be a roadway or other evidence of modern activity which could have modified the tree growth pattern.

A third possible Indian village site was discovered just opposite the Park boundaries,about 1/4 mile from the Camping Area.This site is indicated by two positive vegetation anomalies of the circular form which which develop some times near middens and isolated brush shelters.When field checked,however,no evidence of artifacts (shell,bone,worked stone,charcoal,etc.) was found.

Plant growth was heavy,though,and only a rapid reconnaissance was made.

A much larger possible site appears about 300 m. upstream.

This site is marked by a very large negative vegetational anomaly.No artifacts were found here either,but its proximity to the upstream fishtrap and the much more likely site (18 WA 755439) indicates that the entire region may be part of a contiguous settlement area.

b. A rectangular pattern which may be an old building foundation was noted near the farm just northwest of the Park.This pattern was not noted until after the field trip,and was not field checked.The pattern could not be found in the 1958,1967 or 1969 photography.

There may be a growth of flowering plants along the top of the pattern.These may have been in bloom at the time the large scale color infrared (scale 1/3,000) aerial photography was obtained on April 20,1974,but not at the times of the year when coverage was obtained in previous years (25 March,8 April,9 August).The scale of the earlier photography is much smaller,too.The 1958 photography is smaller by a factor of 1:6.6,and the 1969 photography by a factor of 1:4.

CONCLUSIONS

It is suggested that there may be additional foundations within the walls of the Fort.These may consist of another building of the same general configuration as one of the Enlisted Barracks,the the "Officer's Barracks",or,there may be,instead,be foundations of several smaller buildings which

may have been built when the Fort was used as a military prison (POW camp) (during the Revolutionary War).

It is believed that a foreward slope defense plan was developed to reinforce Fort Frederick,and that a"Counter-Fort" or stockade may have existed about 100 m. out from the northwest bastion.The indications of this may be seen in the vertical aerial photography.THESE TRACES MAY NOT BE RELATED TO THE FORT,HOWEVER.DURING THE 131 YEAR PERIOD THAT THE AREA WAS FARMED,EXTENSIVE RESIDUAL CROP MARKS MAY HAVE DEVELOPED.

Two stone fishtraps exist in the Potomac near the boundaries of Fort Frederick State Park.It is suggested that the upper one (the one upstream) may have been emplaced during Colonial Times,and if so,may have been built in support of the defenders of Fort Frederick.

RECOMMENDATIONS

It was recommended that additional field work be conducted later in the year during the adverse growing season,or in the spring.It would have been helpful to have additional aerial photography taken about that time also.Low level natural color and color infrared stereo-oblique photography would have been sufficient.Field work ("ground truth") should be conducted as soon as possible after the photography has been taken.

It was (and is) recommended that an intensive search be made using a metal detector or magnetometer,and that the pattern detected in the preliminary reconnaissance within the walls of the Fort be sensed again,and that trenching and coring be undertaken to locate the conditions which create the magnetic response.

It was recommended that "ground truth" operations be undertaken of the two fishtraps in the near future.Low water can be expected in the Potomac during the months of September and October.

If it is desired to get artifacts ("brushnet anchors",etc.) from behind the traps,this is the best season to search for them.

- end -